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MAR 21 1949

March 21, 1949

STEEL

The Magazine of Metalworking and Metalproducing

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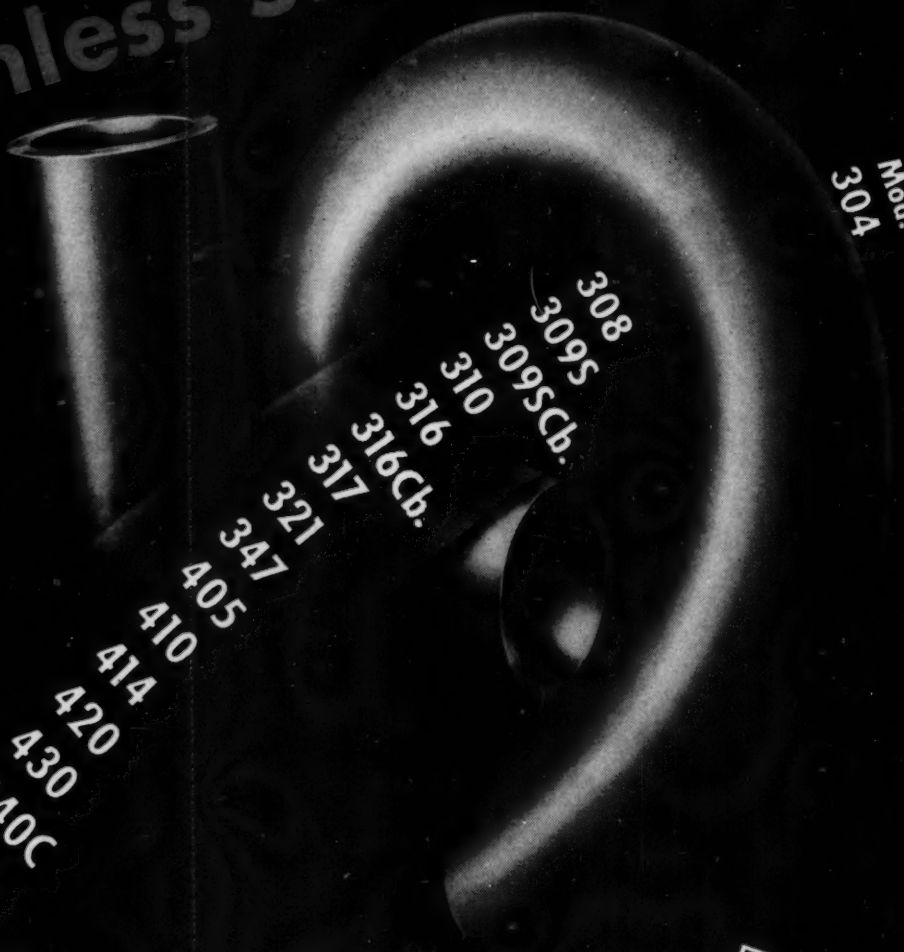

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Behind the Scenes...

Promotions Dept.

There are a lot of important pages in this issue. As usual, there are no really unimportant pages anywhere in any issue of STEEL, unless maybe you count this one. And only two-thirds of this one is unimportant, because occasionally there's important news in the third of this page we don't fill with our mouthings. Like this week, for example, where you'll find down in the fine print that the Penton Publishing Co. has a new Chairman of the Board of Directors and a new President. The names are familiar—the titles are new and shiny.

Here's An Important Answer

If we had to nominate the twelve most important pages in this week's book, however, we'd be forced to name the special report on "How Much Steel Capacity?". Although we don't number Harry Truman among our subscribers, we hope he gets a chance to read it. Fortunately, there are lots of people in Washington who will have a chance to read it, and maybe some of the facts and figures will reach the right place to help answer some of the questions about steel expansion. It is one of the most comprehensive studies yet made on the subject, and in anticipation of demand, we are preparing to have reprints made, so if you'd like a copy or two we'll be glad to send them along. If you want quantities, we'll figure out a price for you.

We're Sorry

That twelve page special report mentioned above caused a bit of reshuffling of editorial plans at the last minute, so that the article on Roll Pass Design by R. F. Beynon, scheduled for this issue, couldn't quite make it. The editors expect it to be in next week, instead. Our apologies for a bum steer last week.

Puzzle Corner

Laurence McKinney, the chief puzzler of Albany, N. Y., takes us to task in a mild sort of way for being unspecific in our puzzle of the trains last week. Says he, wagging a mental finger at us, there's a possibility of two answers, depending on which of many directions the trains rush off in. The obvious, quickest answer, and we won't count you wrong if this is what you got, is 55.4 miles for the shortest distance between them, after train A has traveled 69.3 miles and train B has traveled 46.2 miles. But, continues our 205th reader, if they happen to mosey off in a couple other directions, it is entirely possible that the distance travelled by train A would be 134.166 miles and by train B 89.444 miles. In that case, they had better be freight trains, because lots of blood would otherwise be spilled when the distance between them becomes zero! Here's a theoretical number for you, if you can find it. What number can be multiplied by 4 and the result divided by 5, with the final number the same as the starting number except that the first digit has been removed and placed at the end? We must warn you that this is no parlor game—take plenty of scratch paper along!

Five Decades Ago

One of the important technical articles of our issue of March 23, 1899, covered the invention of a measuring device which was accurate to a ten-thousandth of an inch—"which is sufficiently close for any practical work". Today's operations are quite often impractical, by that standard. But things haven't all changed as much as might be expected. Prices on a lot of iron and steel items have now crossed what was accepted as the highest possible maximum and are still rising, with sellers still crawling on the bandwagon and buyers asking where it will all end. Rumors of the formation of a giant steel consolidation are flying through the trade, and there is much speculation as to what will happen. One persistent advertiser is trying to sell a whole installation of patent fire extinguishers and fire pails—he doesn't say why!

Spring Is Sprung, Etc.

Here's hoping that by the time these lines reach you, the winter's snow will be a thing of the past. We wish this particularly to all readers in the middle west, which has had such a bumper crop this year. Around these parts there has been no snow to speak of, which has made the small fry most unhappy. In fact, the other day one of our young ones was watching us put fertilizer on top of a small, sort of puny snowfall which at that point was covering our front lawn. "Daddy", says the kid, "do you suppose that fertilizer will make the snow grow enough so I can get my sled out?".

Shrdlu

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STEEL

Vol. 124—No. 12 March 21, 1949

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Continuous Induction Heating Expedites Rock-Bit Forging

Efficient Warehouse Handling Effects Rush Deliveries

Impact Extruding Aluminum

Five-Zone Rotary Furnace Heats Billets for Piercing

STEEL

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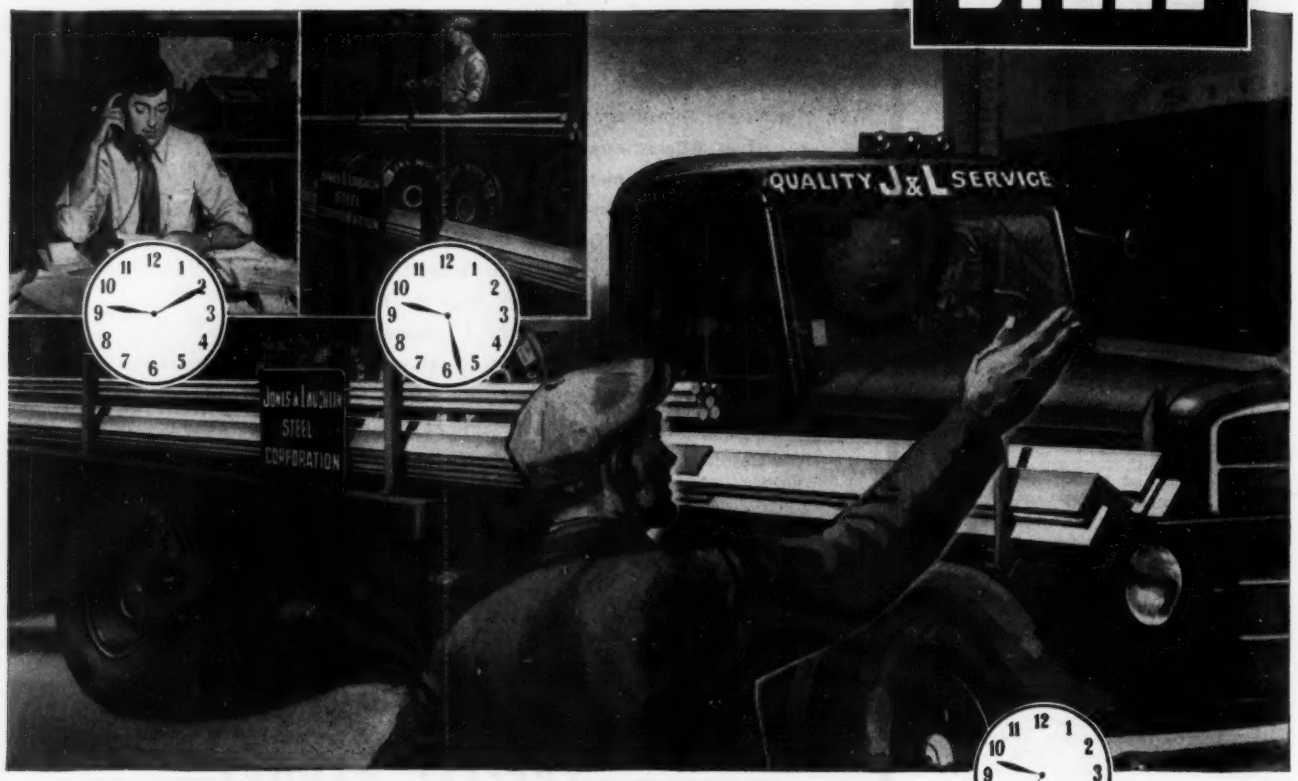

Order received 9:10 A.M.—Delivery truck on way 9:35 A.M.

At 9:10 on a Saturday morning, a telephone rang at Jim Sproat's desk in the J&L Warehouse in Chicago. At the other end of the wire, 80 miles away in Mishawaka, Indiana, C. L. Mechling, purchasing agent of the Dodge Manufacturing Corporation, said he needed some help . . . quick. He had to have seven bars of 2-7 16″ cold finished steel shafting, 16 and 20 feet long. They were needed for the power transmission system in a big industrial plant. Until they arrived, the plant could not operate. When could he have them?

There was some fast footwork. In the warehouse was a J&L truck which was going through Mishawaka. In the warehouse was steel of the proper grade and size. At 9:27, the steel was being pulled out of racks. At 9:35 the truck was on its way.

Unusual? Certainly, it was unusual. J&L Warehouses cannot get every order on its way in 25 minutes! But it happens often enough to make a lot of customers lean heavily upon them.

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March 21, 1949

Dangerous Trend

An analysis made by the National Industrial Conference Board reveals little evidence to show that productivity for manufacturing as a whole has increased during the past two years. Output per man-hour in the first nine months of 1948, while about 6.7 per cent above that of prewar 1939, was but fractionally higher than in 1946 and 1947. This means that in the past two years the sharp increases in wage rates have not been offset by any appreciable gain in output per man-hour.

Quite by chance, figures in the 47th annual report of the United States Steel Corp., issued last week, afford a significant long-term view of productivity which corroborates the point made by NICB. In 1902 the corporation had 168,127 employees who worked an average of 68.4 hours per week. In 1948 there were 296,785 employees who worked an average of 38.2 hours per week. The small working force of 1902, working almost 10 hours a day seven days a week, put in 11,499,887 man-hours per week or 597,994,124 per year. In 1948 the much larger working force, on a short week, put in 11,337,187 man-hours per week or 589,533,724 per year.

In 1902 U. S. Steel sold products valued at $423.1 million and in 1948 its sales totaled $2,481.5 million. Thus sales in 1902 were 71 cents per man-hour and sales in 1948 were $4.04 per man-hour. This improvement in productivity is what one would expect. Undoubtedly it reflects more efficient organization, heavy expenditures in improved plant and equipment, marked technological progress, greater safety, better health and other factors.

However, while output per man-hour increased encouragingly during the 47-year period, output per dollar of wages actually declined. In 1902, when the average hourly wage was 20.1 cents, one dollar in wages accounted for $3.52 in products sold. In 1948, with an average hourly wage of $1.68, a dollar in wages netted only $2.40 in products sold.

The short-range study by NICB and the long-range comparison afforded by U. S. Steel figures lead to the same conclusion, namely, that the trend is toward lower output per wage dollar. Unless this trend is reversed soon, there will be serious trouble.

* * *

NO CAUSE FOR CONCERN: Over a period of many years the American steel industry has operated at an average of 70 per cent of steel ingot capacity. Highest operating rate in any calendar year was 98.1 per cent in 1942. The lowest was 19.5 per cent in 1932.

In a few years during World War II and in 1947 and 1948 the industry for the first time in its history was hard-pressed to meet demand. Of course, demand in both instances was abnormal and unprecedented. Nevertheless certain persons in the service of the federal government and in the employ of labor unions declared that the steel industry should increase capacity to fantastic heights immediately. They practically ignored the substantial expansion programs which most steel producers had initiated after the war ended.

These criticisms of the steel industry prompted the President of the United States to suggest that the government undertake to increase steel capacity if the private companies were unwilling or unable to do so.

In order to throw light on this question of "how much steel capacity?", the editors of this publication have prepared an analysis of the

(OVER)

conflicting views and present for the first time an independent study of the subject by William C. Buell Jr.

After reading this 12-page digest of pertinent testimony, most readers, we believe, will agree that there is no sound basis for concern as to the ability of the steel industry to provide sufficient capacity to meet normal demand with its historic ample margin of safety for reasonable emergencies. —pp. 69-80

* * *

IN RESTRAINT OF TRADE: Real reason why John L. Lewis ordered the two-week coal mining holiday is not opposition to Dr. James Boyd as director of the Bureau of Mines or intent to memorialize miners injured or killed. These are convenient excuses to cover the coal czar's desire to reduce coal stocks above ground from 70 million tons to a more normal figure of 45 million.

This will place Mr. Lewis in a more favorable bargaining position in wage negotiations a few months hence. It will bolster the coal price structure. If the coal operators had pulled a stunt like this, it would have been construed as restraint of trade, which is illegal except for unions and union chiefs.

Mr. Lewis' act will assure Dr. Boyd of confirmation of his appointment and will help to put more provisions of the Taft-Hartley act into the new labor bill. Chief victims will be the miners and the furloughed railroad men, who lose wages. —p. 64

* * *

GIANTS ARE NOT ALIKE: Breakdowns of the 1948 sales dollars of General Motors and United States Steel reveal significant differences. To suppliers for materials, supplies and services, GM paid 50.2 cents, USS 40.7 cents; to employees GM paid 28.5 cents, USS 41.8 cents; taxes for GM were 9.8 cents, for USS 6.4 cents; GM provided 2.1 cents for depreciation and obsolescence, USS provided 5.9 cents. Net income for GM was 9.4 cents, of which 4.5 cents went to stockholders and 4.9 cents were retained for use in the business. U. S. Steel's net was 5.2 cents of which 3.1 cents went to stockholders and 2.1 cents were retained.

Noteworthy are the facts that General Motors pays more of its sales dollar to suppliers than does U. S. Steel whereas the latter spends much more of its dollar for wages and depreciation than GM. These differences, coupled with the disparity in net incomes, reflect the characteristics of diversified manufacturing in contrast to those of producing basic materials.

—pp. 65, 88

* * *

NEW WAYS TO WEIGH: During the past five or six decades marked progress has been made in the development of automatic weighing and recording devices for scales. By removing the human element from many weighing operations, more accurate and consistent results have been made possible and the speed of weighing has been increased.

Some authorities in the scale industry now are convinced that a wave of new major changes in weighing is imminent. Recent work with precision strain gages to develop them into a satisfactory weighing method indicates that in the near future the need of scalemen possessing a sound knowledge of electronics and instrumentation will be increased. Apparently the trend in weighing technique is toward machinery that will do more weighing in less time and will require fewer man-hours of supervision. —p. 102

* * *

THIS SPELLS PROGRESS: During the past year breakouts have occurred around the tapholes of three carbon-lined blast furnaces. In the case of each failure, operators of the furnaces, engineers and manufacturers of the supplies or equipment involved have co-operated whole-heartedly in efforts to make all of the facts available and to ascertain the cause of failure at the earliest possible moment. These failures have been discussed freely at several open meetings of two blast furnace and coke oven associations.

This sensible policy of attacking the problem openly and frankly is in sharp contrast to the "hush hush" attitude which prevailed not too many decades ago. Then it was customary to surround operating mishaps with a wall of secrecy. Everybody was reluctant to talk about them to outsiders.

The present policy is a sign of real progress. It will hasten the solution of many vexing operating problems. —p. 120

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

BUSINESS WEATHER— Price competition is returning to the metalworking market places. Manufacturers of standard household appliances, such as refrigerators and ranges, are cutting prices at the factory level to stimulate lagging sales (p. 62). Premium prices for iron and steel products tend downward. A sharp reduction in lead prices has caused at least one supplier to reduce automobile battery prices (p. 63). Meanwhile, steel ingot production (p. 147) again edged upward to an alltime weekly record of 1,871,169 tons, or at an annual rate of more than 97 million tons.

ALLOCATIONS— Much of the pressure is off the voluntary allocations programs as steel supply-demand balance approaches. The voluntary programs are due for a sweeping downward revision June 1, with freight cars, armed forces, barges, tankers, warm air heating, tank and oil field production equipment taking the sharpest reductions (p. 61). Steel thus freed will be released on the open market.

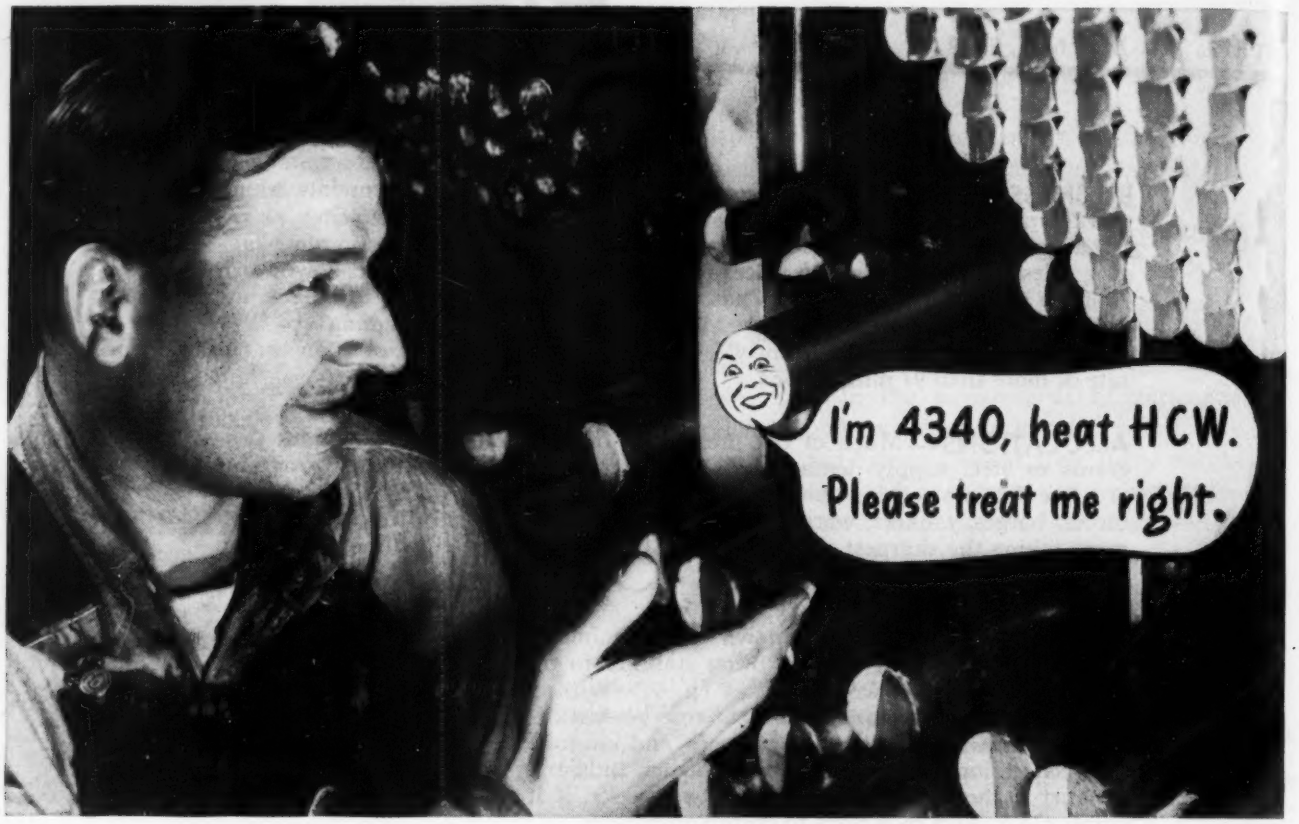
LEWIS PLAN— Current shutdown of coal mining represents the plan of John L. Lewis, miners' chieftain, to bring stability to the coal industry, plagued by over production and wobbly prices (p. 64). With coal stocks abnormally high, Mr. Lewis figures a holiday will cut reserves back to normal, permit full operation of the mines after mining resumes, and improve the miners' chance for winning concessions in their new labor contract. Industrial operations are not likely to be hurt if the shutdown lasts only two weeks; if it extends beyond that time, some steelmakers may have to curtail operations.

HOW MUCH STEEL CAPACITY?—Some labor union and government economists have maintained a fairly constant barrage of arguments for substantially increased steel capacity. Steel producers, while expanding capacity substantially, have often looked askance at the forecasts of steel needs by the labor and government men and at times have countered with studies indicating the expansionists are extravagant in their estimates of future needs. A special study by the editors of STEEL (p. 69) presents the thinking of both sides on this controversial question.

PRODUCTIVITY—Overall gain in labor productivity since 1939 has averaged less than 1 per cent yearly, according to a study by the National Industrial Conference Board (p. 81). Productivity gains have not approached the gains in wage rates. Labor costs per unit of production have increased an average of 11 per cent annually . . . . United States Steel Corp.'s financial and operating history, contained in the pamphlet report, shows that in 1902 almost 55 man-hours were required to produce a ton of steel (p. 65). In 1948, only 20 man-hours were required, indicating an average annual increase in productivity of about 2¼ per cent between the two years. During the same period, however, employment costs per ton of steel (on basis of ingot production) increased from $11 to $35.

ORE FROM LIBERIA—Republic Steel Corp. has acquired a stock interest in a Liberian mining company which controls an extensive deposit of high-grade iron ore suitable for open hearth use (p. 66). A 45-mile railway, terminal facilities and other construction necessary to get the ore to seaboard are underway and will be completed in about two years.

HERE AND THERE IN INDUSTRY— Congress is rebelling against various phases of the Truman program and administration advisers are contemplating dropping some of the more controversial features (p. 82) . . . . Vanadium-Alloys is producing a steel powder (p. 65), parts pressed from which have a tensile strength approaching that of wrought steel. . . . Arguments over frameless vs. frame-and-body types of auto construction flamed anew (p. 87) at the SAE meeting in Detroit. . . . . Carborundum Co. is undergoing a transition which will decentralize the company into four major divisions formed around groups of like products (p. 90) . . . Republic Steel will put a new battery of coke ovens into operation at Warren, O., within two weeks (p. 90) .



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STEEL
A PENTON PUBLICATION

Steel Allocations Cuts Coming

OIC planning sharp reductions June 1 in major preference programs, including armed services and freight cars. Savings to exceed needs of three new proposed programs

MOST sweeping downward revision in the voluntary steel allocation programs since inception of the Office of Industry Cooperation is contemplated, Earl W. Clark, director of the agency, told a representative of STEEL last week.

Proposed reductions will become effective June 1, since allocations for April and May already are in progress and the June date is the earliest on which cuts can be made. Sharpest reductions will be made in allocations to the armed forces, freight car builders, barges, tankers, warm-air heating equipment, tank and oil field production equipment, but in addition the allocation for merchant vessels also will be curtailed.

To Release Tonnage—Mr. Clark would not say how much each category would be cut but said the overall curtailment would be in excess of any new tonnages required for three new allocation programs now being set up. Further, he said, between two-thirds and three-fourths of the savings will be unconditionally released to the open market.

Tonnage under allocation as of Mar. 1 stood at 520,108 monthly.

What really is taking place is a shifting of tonnage among the preference programs, the OIC feeling its overall program has reached the stage where constant revision is necessary to insure that steel allocated to an inactive use is rechanneled where it is in greater demand.

Monthly Review—It is planned accordingly, for the remainder of the life of the voluntary allocations plan, to review, month to month, all allocation programs with a view to screening for each succeeding quarter.

Below is a table showing product allocations to the various programs as of Mar. 1. This shows the biggest product burden is in plates which account for 40.6 per cent of the total allocated tonnage. Shapes account for 17 per cent; hot-rolled bars 12.2; cold-rolled bars 1.3; hot-rolled sheets 10.8; galvanized sheets 3.0; pipe 4.8; wheels and axles 3.9.

Protest ECA Plate Allocation

THREE new steel allocation programs are now being set up by the Office of Industry Cooperation.

It is proposed to provide ECA countries with an average of 32,375 tons per month for five months; baseboard radiation, 950 tons monthly for three months, and the Reclamation Bureau of the Department of the Interior, 16,725 tons monthly for five months.

Meanwhile OIC has extended the program for steel housing to effect continued control by the agency of steel already allocated for this program. However, there is no further allocation of steel for this program contemplated, the extension simply being to keep steel already earmarked to it within the jurisdiction of OIC.

Also the allocation for warm-air heating furnaces has been extended over second quarter only. There was no allocation in March for this program.

Protest ECA Allocation—Some opposition to the ECA allocation has developed. In the total tonnage for this agency 104,775 tons of ship plates are included and the Shipbuilders' Council of America, at the meeting to consider the plan, pointed out that ship plates are critically scarce in this country.

Furthermore they observed, the plates would go for construction of tankers abroad, which would mean the completed tankers would compete later with American shipping.

Another item objected to in the proposed allocation, is 16,265 tons of electrical sheet. Industry users maintain it would be desirable to substitute some less critical product.

Hoffman Concerned — Paul Hoffman, ECA administrator, expressed concern at the hearing over what he said is the increasing difficulty ECA nations have encountered in placing orders for steel in this country, even within the restricted quotas which have been established.

Approval of the proposal would give limited priority to orders placed on behalf of the designated ECA countries for steel plates, sheets, electrical sheets and strip as follows:

ALLOCATIONS, MAY-SEPTEMBER
(Net Tons)

Plates	104,775
Galvanized sheets	2,475
Hot and Cold-rolled sheets	26,140
Electric sheets	16,265
Hot-rolled strip	7,000
Cold-rolled strip	5,215

Tin Restrictions Removed

ELIMINATION of special quota restrictions on the amount of tin which may be used in the manufacture of beer and animal food cans was announced last week by the Depart-

VOLUNTARY STEEL ALLOCATION PROGRAMS AS OF MAR. 1, 1949

Monthly Steel Rquirements (Net Tons)

	Plates	Shapes	Bars H. R.	Bars C. R.	Bars Reinf.	Sheets H. R.	Sheets C. R.	Sheets Galv.	Pipe	Seamless Tubing	Tin	Semi-Finished	Rod & Wire	Rail & Accessories	Wheels & Axles	Rigid Conduit	Total
Freight Cars	111,347	53,640	32,885			22,309		3,125	2,961			3,465			19,950		249,682
Atomic Energy	2,730	2,868			3,653	291		418	2,810	1,753				1,110		781	16,414
Armed Forces	13,470	11,370	18,780	5,920		19,300		2,980	9,540	4,505	330	11,140	4,450	510	210		102,505
Tank & Oil Field	7,368	285	1,142			9,002			733								18,530
Barges	17,700	6,250	300			150			600								25,000
N. A. C. A.	575	600	18		522			86	80					11		34	1,926
Tankers	32,011	5,265	1,041			288		287	1,488								40,380
Merchant Vessels	11,143	1,905	670			421		519	757								15,414
Oak Ridge Pipe Line									4,750								4,750
Mining Machinery	12,720	5,455	8,345	765		2,745	65		655	330		320	15	240	130		31,785
Ore Cars	1,025	445				722											2,192
Anthracite	550	320	240			750			410					860			3,130
Grain Bins			200			200		8,000									8,400
Total	210,639	88,403	63,621	6,685	4,175	56,178	65	15,415	24,784	6,588	330	14,925	4,465	2,731	20,290	815	520,108
% of Total	40.6	17.0	12.2	1.3	0.8	10.8	.0001	3.0	4.8	1.3	.0006	2.9	0.9	0.5	3.9	.001	100.0

ment of Commerce. Move does not affect the limitation on tin consumption in overall manufacture of cans, which remains at 50 per cent of 1947 consumption. Change is designed to remove hardships which former restriction placed on some small canmakers.

Asks Ban on Pricing Suits

TWO-YEAR moratorium on Federal Trade Commission antitrust suits against businessmen who absorb freight in good faith or use delivered prices without conspiring has been recommended to Congress by a Senate commerce committee headed by Sen. Edwin Johnson (Dem., Colo.).

Senator Johnson's committee reported that permanent changes in the antitrust laws are needed but urged the two-year ban on suits because of the need for some immediate legislation. Permanent legislation will require long study and many congressmen want to see how the Supreme Court rules in the rigid steel conduit case before voting on permanent legislation.

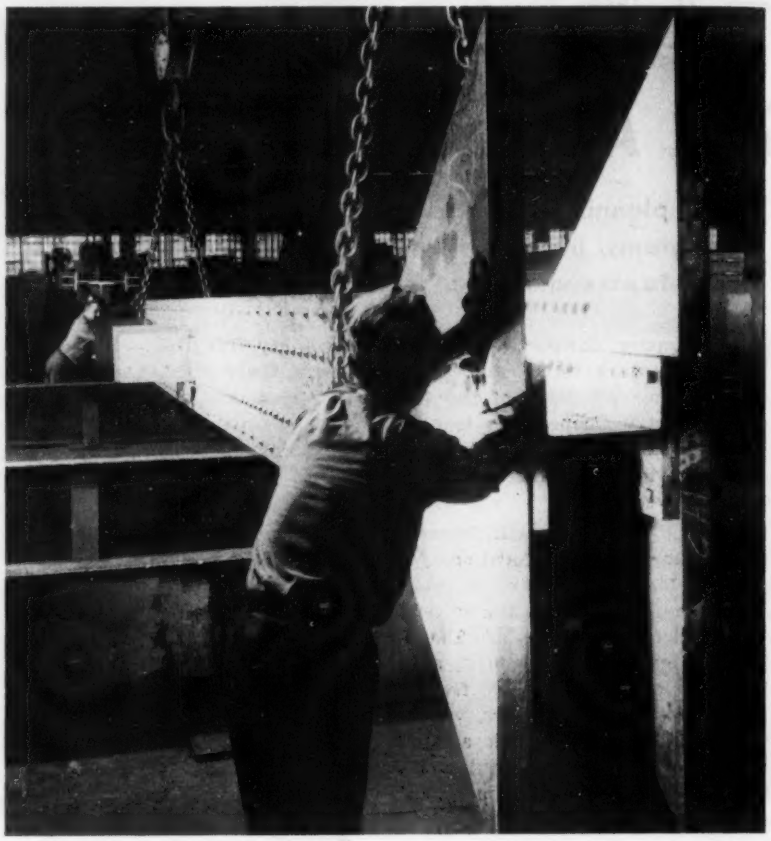
A 16-month moratorium already has been approved by the House Judiciary Committee. Chairman Pat McCarran (Dem., Nev.), chairman of the Senate Judiciary Committee, has said he will ask for a 12-month moratorium.

Good Faith No Defense

GOOD faith is an insufficient defense in price discrimination actions brought by the Federal Trade Commission under the Robinson-Patman act. This is the interpretation read into a decision by the federal court of appeals in Chicago involving the Standard Oil Co. (Indiana). The oil company had granted price reductions on gasoline to four jobbers in the Detroit area in an effort to meet competition of other producers competing for the business of the jobbers. However, the court, although admitting the company acted in good faith, held that the reductions enable the jobbers, who had retail outlets, to sell gasoline cheaper than other Standard dealers and was thus discriminatory.

Appliance Prices Cut

PRICE competition has returned to the household appliance market. Among the first of the hard goods to enter a buyers' market, appliance sales have been lagging since late last year. Many producers have been forced to curtail production and furlough workers. Prices have been weak at the retail level, but factory prices on standard appliances by the leading makers have remained fairly firm until this month.



WINGED PILLARS: Being fabricated in U. S. Steel Corp.'s American Bridge Co. plant at Ambridge, Pa., for the United Nations Secretariat building in New York are 40-foot long, 33-ton columns with wing plate at the base. The wing plate, which will be erected at the base of the 39-story structure, is more than seven feet high and almost five inches thick. Steel erection is to begin soon

General Electric Co. reduced delivered prices on its electric ranges and refrigerators by up to $20 a unit. At the same time, quotations on television sets, vacuum cleaners, home freezers, commercial refrigeration equipment and wire and wiring devices were reduced.

Hotpoint Inc., a GE subsidiary, has announced new models of electric ranges on which prices range as much as $15 below comparable 1948 models. Featured is a new standard model range to retail at $179.95.

Sears Cuts 8 Per Cent—Following the GE action, Sears, Roebuck & Co. cut refrigerator prices by 8 per cent as a "needed sales stimulant." Last December, Sears, Roebuck had slashed refrigerator prices by 5 per cent. Today, the company says "an old-fashioned competitive market" is back in the appliance field.

Montgomery Ward & Co. also cut refrigerator prices last December. Last week, the company officials were reported studying their competitors' price actions.

Frigidaire Offers New Models—General Motors' Frigidaire Division has reduced prices on 1948 model refrigerators by 5 per cent and 1948 model electric ranges by 7 per cent in preparation for introduction of its 1949 models. New models will be priced the same as 1948 models before the price cut.

Nash-Kelvinator has adjusted downward prices on several 1949 range and refrigerator models. Decreases average 5 per cent.

Philco Corp. reduced prices on its radio receiving sets from 6 to 15 per cent Mar. 16, and started a special sales campaign the same day. Radios were the first of the household equipment items to enter the buyers' market and sharp markdowns in prices have been in effect by many makers for more than a year.

430,000 Jobless 15 Weeks

UNEMPLOYED persons looking for work for 15 weeks or longer climbed

to 430,000 in February, compared with 310,000 in January and 250,000 in the last quarter of 1948, according to the Census Bureau.

Earlier the bureau had reported an increase in unemployment to 3,221,000 in February from 2,664,000 in January and 1,941,000 in December.

Civilian labor force in February totaled 60,388,000, compared with 60,078,000 in January and 59,778,000 in February, 1948. Total employed in February was 57,168,000, compared with 57,414,000 in January and 57,139,000 in February, 1948.

Battery Prices Lowered

AUTOMOBILE battery prices have been reduced an average of 15 per cent by Sears, Roebuck & Co. Reduction is attributed to the recent sharp decrease in lead prices.

Willys Cuts Prices $25-$270

WILLYS-OVERLAND Motors Inc. last week announced across-the-board price reductions ranging from $25 to $270.

Reduction was ascribed to better steel supplies from mills. Company is just about out of the conversion steel market and has no long term contracts for this type of premium-priced material.

Largest reduction was in the Jeepster which was cut from $1765 to $1495. The Jeep was cut from $1220 to $1195.

Car Scrappage Half Normal

SCRAPPAGE of passenger cars in 1948 was approximately half the normal rate, R. L. Polk & Co., Detroit, discloses. At the same time scrappage of trucks ran approximately 60,000 more than in a normal year.

A total of 885,517 passenger cars went off the road last year, as compared with a 24-year average scrappage figure of 1,617,853.

GM Contracts for Iron, Coke

GENERAL Motors Corp. has contracted Pittsburgh Coke & Chemical Co. to supply a "substantial" tonnage of pig iron, foundry coke and furnace coke for a period of five years. Commitment will begin Sept. 1 at prices to be adjusted according to prevailing market conditions.

To meet the GM requirements, coking facilities of Pittsburgh Coke & Chemical are being enlarged and a battery of 35 ovens installed. When completed, these will increase company's present capacity of 450,000 tons annually by 50 per cent.

As part of the agreement, GM is constructing 20 of the 35 ovens on property leased from Pittsburgh Coke & Chemical. All will be operated and managed by the Pittsburgh company.

Contract to supply GM with pig iron contemplates the use of outside blast furnaces, which will permit the Pittsburgh company to continue to supply its present customers.

Unconfirmed trade reports indicate some of the pig iron will be obtained from Pittsburgh Steel Co. and from the Struthers furnace near Youngstown. Pittsburgh Steel has been selling some basic iron. Kaiser-Frazer's 3-year lease on the Struthers stack expires next fall.

Neither GM nor Pittsburgh Coke & Chemical have revealed how much iron will be shipped under the agreement, nor how the materials are to be used by GM. One report is that some of the foundry coke and pig iron will be shipped to Wheland Co., Chattanooga, Tenn., for the production of brake drums for GM. Another report, also unconfirmed, is that furnace coke will be shipped to Wheeling Steel for use in one of the three blast furnaces it has leased at the Mingo plant. Rehabilitation of the last of the three stacks is expected to be completed this summer and Wheeling is expected to operate it for GM, with the latter supplying coke and other necessary raw materials.

JANUARY SHIPMENTS

(ALL GRADES INCLUDING ALLOY AND STAINLESS)

Steel Products	Number of companies	Items	(Net Tons) Net Shipments	Per cent of Total
Ingots, blooms, slabs, etc.	44	1	288,991	5.0
Skelp	6	2	4,933	0.1
Wire rods	19	3	54,243	0.9
Structural shapes (heavy)	11	4	356,063	6.2
Steel piling	3	5	26,182	0.5
Plates	28	6	608,291	10.6
Rails—Standard (over 60 lbs.)	4	7	167,220	2.9
Rails—All other	5	8	13,663	0.2
Joint bars	7	9	12,241	0.2
Tie plates	6	10	39,192	0.7
Track spikes	8	11	13,075	0.2
Wheels (rolled or forged)	5	12	29,805	0.5
Axles	4	13	19,562	0.3
Hot-rolled bars (including light shapes)	40	14	708,087	12.3
Hot-rolled bars—Reinforcing	21	15	138,860	2.4
Cold finished bars	33	16	142,418	2.5
Tool steel bars	17	17	6,623	0.1
Pipe—Standard	16	18	188,881	3.3
Pipe—Line	12	19	189,682	3.3
Pipe—Oil country goods	14	20	123,752	2.2
Tubes—Boiler	3	21	10,097	0.2
Tubes—Mechanical and pressure	21	22	74,088	1.3
Miscellaneous pipe (including conduit)	11	23	24,962	0.4
Wire—Drawn	37	24	235,881	4.1
Wire—Nails and staples	17	25	75,059	1.3
Wire—Barbed and twisted	14	26	22,151	0.4
Wire—Woven wire fence	12	27	34,511	0.6
Wire—Bale ties	11	28	6,108	0.1
Black plate	10	29	68,136	1.2
Tin and terne plate—Hot dipped	8	30	140,360	2.4
Tin plate—Electrolytic	10	31	158,660	2.8
Sheets—Hot-rolled	28	32	632,747	11.0
Sheets—Cold-rolled	15	33	603,893	10.5
Sheets—Galvanized	15	34	141,000	2.4
Sheets—Long terne	8	35	12,309	0.2
Sheets—Enameling	7	36	23,347	0.4
Sheets—Electrical	11	37	48,715	0.8
Strip—Hot-rolled	21	38	154,548	2.7
Strip—Cold-rolled	33	39	163,611	2.8
All other	1	40	12	...
Total steel products	138	41	5,761,959	100.0

Steel Ingot Production Statistics

	Estimated Production—All Companies									
	Open Hearth		Bessemer		Electric		Total		Calculated weekly production	Number of weeks in mo.
	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	
1948										
Jan.	6,768,497	95.5	343,169	77.5	361,110	79.0	7,472,776	93.6	1,686,857	4.48
Feb.	6,245,338	94.3	340,596	82.3	354,270	82.9	6,940,204	93.0	1,676,378	4.14
Mar.	6,841,578	96.6	363,235	82.0	403,322	88.2	7,608,135	95.3	1,717,412	4.43
1st qtr.	19,855,413	95.5	1,047,000	80.6	1,118,702	83.4	22,021,115	94.0	1,693,932	13.00
Apr.	5,640,168	82.2	185,089	43.2	392,900	88.7	6,218,157	80.4	1,449,454	4.29
May	6,799,289	96.0	355,562	80.3	416,801	91.1	7,571,652	94.8	1,709,177	4.43
June	6,481,879	94.5	356,810	83.2	417,665	94.3	7,256,354	93.8	1,691,458	4.29
2nd qtr.	18,921,336	90.9	897,461	69.0	1,227,366	91.4	21,046,163	89.7	1,617,691	13.01
1st 6 mos.	38,776,749	93.2	1,944,461	74.8	2,346,068	87.4	43,067,278	91.9	1,655,797	26.01
July	6,346,423	89.8	324,991	73.6	395,610	86.7	7,067,024	88.7	1,598,874	4.42
Aug.	6,631,157	93.6	371,205	83.8	435,246	95.2	7,437,608	93.1	1,678,918	4.43
Sept.	6,592,226	96.3	387,153	90.5	436,231	98.7	7,415,610	96.1	1,732,619	4.28
3rd qtr.	19,569,806	93.2	1,083,349	82.5	1,267,087	93.5	21,920,242	92.6	1,669,478	13.13
9 mos.	58,346,555	93.2	3,027,810	77.4	3,613,155	89.4	64,987,520	92.1	1,660,386	39.14
Oct.	7,118,299	100.5	409,545	92.5	459,268	100.4	7,987,112	100.0	1,802,960	4.43
*Nov.	6,922,656	100.9	411,049	95.9	454,217	102.6	7,787,922	100.7	1,815,366	4.29
*Dec.	6,925,300	98.0	393,609	89.1	452,266	99.1	7,771,175	97.5	1,758,184	4.42
*4th qtr.	20,966,255	99.8	1,214,203	92.4	1,365,751	100.7	23,546,209	99.4	1,791,949	13.14
*2nd 6 mos.	40,536,061	96.5	2,297,552	87.5	2,632,838	97.1	45,466,451	96.0	1,730,737	26.27
*Total	79,312,810	94.9	4,242,013	81.2	4,978,906	92.3	88,533,729	94.0	1,693,453	52.28
1949										
*Jan.	7,287,683	101.1	408,552	92.6	487,260	93.8	8,183,495	100.2	1,847,290	4.43
†Feb.	6,627,079	101.8	379,698	95.3	457,151	97.5	7,463,928	101.2	1,865,982	4.00

* Revised. † Preliminary figures subject to revision.

For 1949, percentages of capacity operated are calculated on weekly capacities of 1,626,717 net tons open hearth, 99,559 net tons bessemer and 117,240 net tons electric ingots and steel for castings, total 1,843,516 net tons; based on annual capacities as of Jan. 1, 1949, as follows: Open hearth 84,817,040 net tons, bessemer 5,191,000 net tons, electric 6,112,890 net tons, total 96,120,930 net tons.

Lewis "Stabilizes" the Coal Market

Coal mining holiday has little effect on industrial operations. Stocks abnormally high. Railroads furlough workers as traffic dips. Strike may bring tougher labor bill

LITTLE industrial curtailment as result of the two-week coal mining holiday ordered by John L. Lewis was discernible at week's end. Nor are effects of the stoppage expected to be considerable this week.

With coal stocks above ground abnormally high, estimated at 70 million tons or 45 days' supply, practically all consumers have more than enough to last through the scheduled strike. Should the stoppage be extended beyond two weeks, some curtailments may become necessary.

Principal adverse effect of the stoppage falls on the railroads and Great Lakes shippers. Railroads were hit immediately by the loss of traffic and were forced to furlough some 60,000 workers. Lake shippers will lack coal cargoes for shipment to the upper lake ports at the start of the season.

Lewis Stabilization Plan—Generally the mining holiday is seen as an effort by Mr. Lewis to stabilize the coal market and shore up a wobbly price structure. Since last fall, coal production has been exceeding consumption and competition within the industry has been intensified. Prices have weakened. Some operators have been forced to curtail production or to suspend operations entirely.

Mr. Lewis doesn't like this situation. In the first place, it weakens his bargaining position in wage negotiations to be held before July 1. In the second place, he well remembers how a glut in the coal market virtually wrecked the coal miners' union during the 1920s.

A two-week cessation of coal mining should reduce stocks to about 45 million tons, considered normal for this season.

Some Operators Happy — Many commercial coal operators welcome the move by Mr. Lewis. Reduction of coal stocks should bring some marginal mines back into production and likewise should prop up prices.

Captive mines, operated by steel producers, however, have been operating on a 6-day week to produce the enormous quantities of coal required for record steel production. Should the holiday be extended beyond the scheduled two weeks, the steel mills would be among the first to feel the coal pinch.

Boyd Opposition Overemphasized—Mr. Lewis' announced reasons for calling the strike—to focus attention on his opposition to confirmation of Dr. James Boyd as director of the Bureau of Mines and as a memorial period for miners killed in 1948 operations—are generally discounted.

Reaction in Washington was sharp. The Senate Interior Committee quickly approved the appointment of Dr. Boyd by a 10 to 1 vote, apparently assuring confirmation by the full Senate.

Capital officials were angered by the UMW chieftain's edict. Many predicted it would be an important factor in influencing congressional action in formulating the new labor-management relations legislation. CIO and AFL leaders also feared that Lewis' action lessened chances for a bill favorable to labor. Proponents of a bill fashioned along the lines of the Taft-Hartley act will use the mine walkout as an argument for more stringent controls over organized labor.

DR. JAMES BOYD

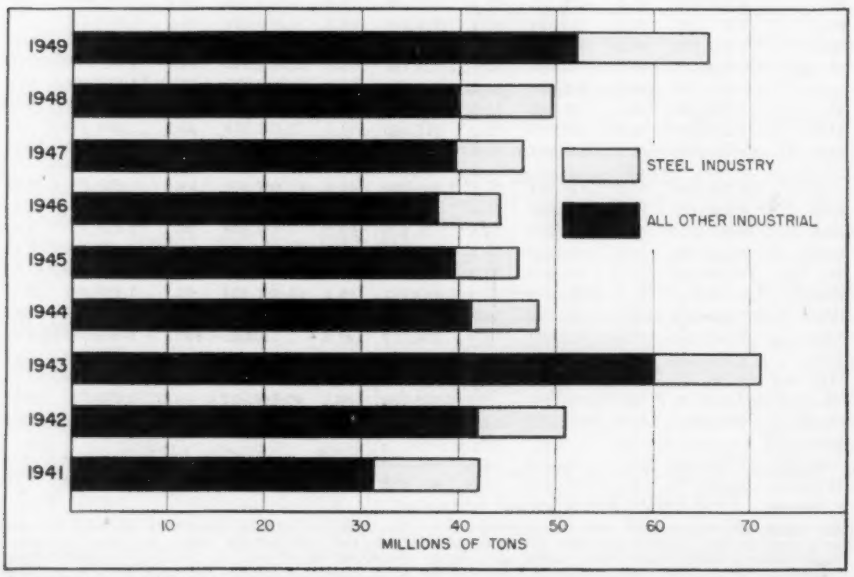
Industry Couldn't Do It—Mr. Lewis' action points up an ironic situation. Because labor unions are exempt from antitrust prosecutions, he is able to take this means to stabilize the coal market without fear of the law.

Should the coal operators attempt to do the same thing in concert, they quickly would be faced with accusations of violating the antitrust laws.

Miners Lose $68 Million—The work stoppage will cost the 425,000 miners idled about $68 million over the two-week period. Part of this may be regained by resultant longer workweeks after mining is resumed.

Also losing substantially in wages are the 60,000 rail workers furloughed, as well as large numbers of coal handlers at industrial and commercial consuming and distributing establishments.

INDUSTRIAL COAL STOCKS ON FEB. 1, 1941—1948



Source: Bureau of Mines.

Steel Jobs at Postwar Peak

JANUARY payroll of the iron and steel industry, estimated at $202,057,000, was the highest on record for that month and was 12 per cent greater than in January, 1948. Only higher payroll was in December, 1948, when wage earners worked an average of one hour a week longer, according to the American Iron & Steel Institute.

Employment set a postwar record of 650,200 in January.

Earnings of hourly, piecework and

tonnage workers averaged $1.713 per hour compared with $1.573 in January, 1948, and $1.694 in December, 1948. These workers averaged 39 hours a week in January, compared with 40 in December.

Profit Margin Narrows

U. S. Steel nets 5.2% on sales, lowest of any year of comparable operations in peacetime

NET INCOME of the United States Steel Corp. for 1948 on the basis of return on sales was the lowest for any year of comparable operations in the company's peacetime history. Last year's earnings were 5.2 per cent of sales. Ingot operations averaged 93.8 per cent of capacity. In previous peacetime years in which operations exceeded 90 per cent of capacity, net return on sales averaged 18.2 per oent, more than three times the 1948 return.

This is graphically shown in the accompanying chart, recording U. S. Steel's history of operations and return on sales, taken from the corporation's pamphlet report.

Cost Inflation—A portion of the report is devoted to the cost inflation which has plagued the steel industry in recent years. All costs of U. S. Steel except interest on debt reflected the postwar inflation. Employment costs, products and services bought and wear and exhaustion reached new alltime peaks in 1948.

Interest charges, on the other hand, receded to a new low.

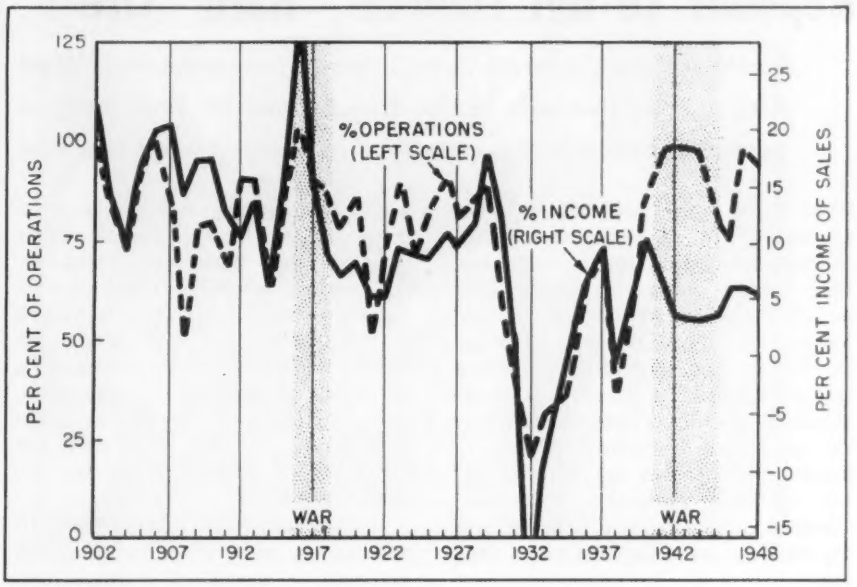
Primarily the increased costs resulted from increases in wage rates. U. S. Steel figures employment costs reached $1.75 per hour per employee in 1948. Purchases of products and services amounted to $1.70 per employee hour. Tax costs amounted to 25 cents per employee hour while wear and exhaustion of facilities and resources amounted to 25 cents, bringing total costs per employee hour to $3.97. After taking these costs and paying the fixed cumulative dividend on preferred stock, and providing for necessary reinvestment in the business, the dividends for common stockholders amounted to 9 cents per employee hour.

Efficiency Increases—In 1902, almost 55 man-hours were required to produce a ton of steel. In 1948, only 20 hours were required per ton, indicating an average annual increase in efficiency of about 2¼ per cent.

Employment costs per ton of steel, however, have risen sharply from $11.01 per ton in 1902 to about $35 per ton in 1948, reflecting an increase in employment costs from 20.1 cents per hour to $1.75 cents per hour.

History of Change—Two pages of statistics, which have become an annual feature of U. S. Steel's report and which tell the story of operations and finances from 1902 to date, reveal the great changes that have occurred in the past 47 years.

PER CENT INCOME OF SALES VS. PER CENT OF OPERATIONS



The work-week in 1902 averaged 68.4 hours, against 38.2 hours in 1948. Average hourly earnings were 20.1 cents per hour, against $1.68 in 1948. Despite the drop in hours worked, weekly earnings rose from $13.75 to $64.21.

Ingot production has nearly tripled from 10,920,000 tons at 97.2 per cent of capacity in 1902, to 29,292,000 tons at 93.8 per cent of capacity in 1948.

Products and services sold brought $423 million in 1902 and $2481 million in 1948. Total employment costs rose from $120 million to $1035 million. Purchases of services and products from others rose from $161 million to $1009 million.

Net income in 1902 was $90.3 million, compared with $129.6 million in 1948.

Thompson Products Sales Up

MORE than $37 million in parts, accessories and assemblies were shipped to aircraft customers by Thompson Products Inc., Cleveland, during 1948, setting a new peacetime mark. Included in this category were compressor assemblies, turbine wheels and nozzle diaphragms for jet engines.

In order to keep its plants in a competitive position for manufacture of aircraft, automotive and other parts, Thompson spent almost $3.5 million during the year for additions and improvements with the largest part of this sum going for a comprehensive postwar retooling program. Net income in 1948 was $4,572,100 on sales of $96,994,774 as compared with a net of $4,577,737 on sales of $92,511,680 in 1947.

American Brake Shoe Sees Drop

"BUSINESS is in a recession which we believe will proceed for a substantial period," William B. Given Jr., president of American Brake Shoe Co., comments in his annual report for 1948.

In the fourth quarter of 1948 all except one company division were receiving orders at a rate below capacity. One company division operated at only 50 per cent of capacity because of lack of demand for its products, and two of American Brake Shoe's newly built plants were unable to reach profitable production during the year. In 1948 a total of $7,132,885 was spent for plant and equipment.

Mr. Given attributed the decline in his company's business to the drop in new railroad car orders, etc.

Net earnings amounted to $5,184,317 in 1948, compared with $4,543,001 in 1947.

Produces Steel Powder

VANADIUM-ALLOYS STEEL CO., Latrobe, Pa., is producing steel powders on an experimental basis, using F. W. Berk & Co. patents. Commercial production is expected within a year.

The steel powder to date has been used for fabricating filters and also on a purely experimental basis for gears. The tensile strength of the parts pressed from the steel powder is said to approach that of wrought steel.

Republic To Get Liberian "Hard" Ore

Purchases stock interest in high-grade iron deposit in West Africa. Forty-five-mile railroad and terminals underway to permit shipment to this country. Ore assays 68 per cent iron

REPUBLIC Steel Corp. has acquired an interest in an extensive deposit of high-grade iron ore suitable for open hearth charge and feed ore in Liberia, West Africa. Heavy expenditures will be required to bring the deposit into production, including the building of a 45-mile railroad, terminals and other equipment. When the railroad is completed two years hence, the Liberian ore will be fed into Republic furnaces in Buffalo, Cleveland, Youngstown, Warren and Canton, O., Gadsden, Ala., and Chicago.

Republic purchased a stock interest in the Liberia Mining Co. Ltd., a corporation of Liberia, which has a concession about 45 miles northeast of the seaport capital, Moravia. The concession contains a mixture of hematite and magnetite, assaying 68 per cent in iron and low in phosphorus, sulphur and silica. Average analysis of Lake Superior ore is 51 per cent iron. The Liberian ore is found in hard masses which may be crushed into lumps suitable for open hearth use to speed up the reduction of carbon.

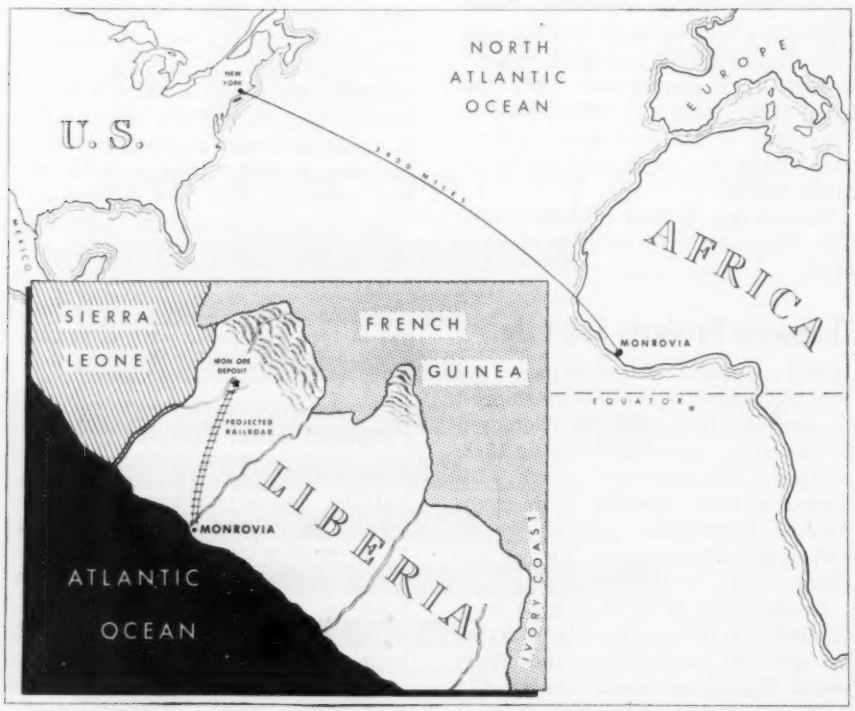
Development Limited — Development to date has been confined to a limited area known as the "Bomi Hills" deposit. This has a cliff-like exposure of a mile or more extending above the surface from 30 to 100 feet. Extensive diamond drilling and surface exploration have revealed a substantial tonnage of the high-grade ore, although it is as yet impossible to estimate with any great accuracy the expected tonnage which the deposit will yield.

A railroad from the deposit to Moravia is now under construction and will be completed in about two years. Terminals of the railroad, equipped to handle a million tons of ore annually, will be completed this October.

Ore will be shipped to eastern United States seaports, a distance of about 3900 miles. Should the St. Lawrence waterway be constructed, it is possible this route might be used to bring the ore to Republic's northern mills.

Republic will continue to use domestic ore, from Lake Superior region, New York and Birmingham, for the bulk of its requirements.

Surplus To Be Sold—The surplus of Liberian ore beyond Republic's requirements will be marketed to the world trade by the Liberian Mining Co. The Liberian ore deposit is located on a concession held by Lansdell K. Christie & Associates, New York.



Location of the Liberian ore deposit, route of the railway being built and shipping routes to eastern United States seaboard are shown in above map

Large Diameter Pipe in Demand

STEADILY mounting need of petroleum producers and public utility companies for large-diameter pipelines promises to keep Far West demand for steel plates at a record high for at least the next five years.

The West's two largest steel mills, Geneva and Fontana, not only are pushing plate production to the limit, but Fontana also is installing new steel producing facilities whose output eventually will be channeled into pipelines. Foundations for Fontana's second 1200-ton blast furnace now are being completed, and the furnace and its attendant coke oven battery are expected to be completed and in operation by December.

More Capacity Likely — Moreover, pipemaking capacity also may be increased. It is reported U. S. Steel Corp. currently is making tentative plans for a pipe welding plant in the San Francisco area to help meet demand which has swamped its pipe plant at Maywood, Calif., operated by Consolidated Western Steel Corp. The Maywood plant's current order file is sufficient for capacity operation running into 1952.

In addition, Kaiser Co. is hurrying construction of its new mill at Fontana for production of diameters up to 14-in welded pipe.

Building Race—The reason behind the current and prospective expansion is the race to build new oil and gas lines, both in the U. S. and the Middle East. It is estimated orders already in hand or scheduled to be placed soon call for more than a million tons of manganese steel plates, sufficient to produce more than 3500 miles of 30 to 34-in pipe.

One of the largest pipelines under construction is that of Arabian American Oil Co. It calls for a trans-Arabian line totaling 1067 miles. The pipe for this carrier is being manufactured by Consolidated Western at its Maywood plant.

Other Lines Projected—Three other major lines now are being projected for the Middle East. Two of these, each about 800 miles long, are planned to connect the Kuwait and Iran oil fields at the head of the Persian Gulf with the Mediterranean. The third, an estimated 500-mile line, would connect Kirkuk with the Mediterranean, and would run through Syria.

Europe's Economic Unity

May be aided by co-ordinated recovery, stronger Benelux union, international power plan

PARALLELING moves toward greater Western political and military cohesion, comes action presaging greater economic co-operation among Western European nations.

The Committee of Eight, consultative group for the Organization for European Economic Co-operation (STEEL, Mar. 14, p. 67), is drafting its report on a 1949-50 program for Marshall Plan countries and will submit it, probably this month, to OEEC in a step to co-ordinate the separate recovery projects of the 19 nations involved.

Belgium and Luxemburg last week agreed to extend credits to the Netherlands to aid in establishing the Benelux economic union. Envisioned many years ago, the union had until now included only Belgium and Luxemburg, with the Netherlands participating merely in a limited way.

Sofina, an international public utilities holding company at Brussels, Belgium, may support a power program which envisages construction of coal-based power plants for inter-European use in the Ruhr.

Benelux

BENELUX economic union is to become effective July 1, 1950, but a preparatory, pre-union stage will be reached this July. The pre-union will be characterized by a progressively freer movement of goods between the three countries and a systematic co-ordination of the commercial and monetary policies in contractual relationships with other countries. All three nations will unify excise taxes and level prices and investment rates. Customs controls between Belgian and Netherlands frontiers will be simplified. Price controls may be lifted in the Netherlands before next July. No price controls exist in Belgium or Luxemburg. The three countries also will undertake further co-ordination of wages and social policies.

Western Germany

INTER-EUROPEAN power program involves construction of 16 power plants in the Ruhr at a cost of from $700 million to $1 billion. These units would use the low-grade Ruhr coal and would have a capacity of 4.8 millon kw.

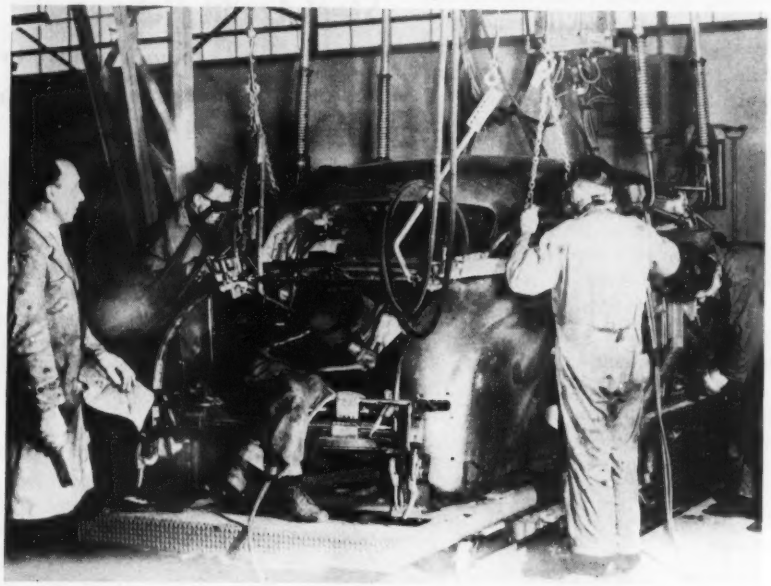
In order to guarantee the debt service on the capital for the program, which would come from abroad, the plan proposes to pledge an annual export of 2 million tons of coal (in addition to present export schedules) and of 2 billion kwh of electric power. Sofina controls various power utilities in Europe, North and South America. Belgian interests may back this proposal because that nation has a great shortage of electric power.

German industrialists are very much interested in the project because it would mean utilization of lignite deposits unfit for export or shipment anywhere. A similar plan, but on a smaller scale, has been abandoned in the meantime. It would have used coal around Cologne. The whole project is regarded as a prototype of inter-European investment as envisioned under the Marshall Plan.

The reorganization of Western Germany's coal industry is accomplished, at least on paper. The coal mines of the Ruhr will be organized into 15 independent companies. These plans will be submitted to various other Allied officials and to the trade unions. After approval, the plans will be carried out, by fixing the values and determining which mines belong to what new company. Plans for reorganizing the steel industry have not gone even this far.

Bizonia's steel production reached another postwar high of 662,247 metric tons in February, as against 651,420 tons in January. Pig iron output fell from 547,370 metric tons in January to 525,319 tons in February, because of the shorter month. Coal production in the Ruhr last month showed a slight decrease to a daily average of 327,800 tons.

Industrial production in several products now exceeds 1936 output. For example, production of electrotechnical goods has reached 163 per cent of the 1936 level; mining (except coal) 118 per cent; glass and ceramics 112 per cent; gas and electric power 141 per cent; and rubber and rubber goods 102 per cent.



EXPORTED TECHNIQUES: Detroit assembly line techniques have been installed by Kaiser-Frazer Corp. engineers at the recently opened K-F Nederlandsche Fabrieken plant at Rotterdam, Holland. Pictured is a body moving on the assembly line at a point where door hanging fixtures are mounted while workers complete body welding operations

Great Britain

QUESTION of lifting British subsidies on steel is again being considered. Many government officials feel that now is the time to get rid of this tremendous expense. The issue is also involved in the nationalization problem which is still progressing slowly through the intricate parliamentary procedure.

Those opposing lifting the subsidies point out that steel prices would rise sharply without government payments, thus endangering Britain's export position. More than 190,000 tons of steel were exported in January, compared with about 165,000 tons in January, 1948. The major buyer of British steel is the Union of South Africa, which took 13,700 tons in January, followed by the Netherlands, which bought 10,900.

Industrial activity in Great Britain continues very active, limited only by raw materials shortages. Supplies

of virtually all steel products remain very tight. Rail steel is unusually scarce, partly because of a recent decision by the nationalized British railroads to change their rails from the traditional "bull head" type to a flat-bottom design which will have longer life. Two types will be made, one of 109 pounds per yard and the other of 98 pounds per yard. The heavier will be laid over about 22,000 miles of track. The entire changeover will be made gradually.

British steel ingot and casting production in February, at the annual rate of 16,176,000 tons compared with 15,049,000 tons a year ago, was the highest rate of output ever achieved. During the month, pig iron was turned out at the annual rate of 9,422,000 tons, against 9,169,000 tons, a year ago.

France

FRENCH economic picture, one of almost unrelieved gloom since the war, is becoming tinged with brighter hues.

The cost of living index is dropping and production figures generally exceed those of 1938 and in some cases those of 1929. Many products have been released from controls, and it now is even proposed to sell automobiles freely to all French nationals.

The government has indicated that no tax increases will be necessary for the present; the recent loan drive has been highly successful, indicating increasing confidence in the French economy.

January's pig iron production, at 694,000 metric tons, was 81 per cent of the 1929 output and 130 per cent of 1938. Steel ingot and casting production, at 734,000 tons, was 89 per cent of 1929 and 140 per cent of 1938. Rolled steel output equaled 1929 production and was 138 per cent of 1938 figures. This level will be maintained, but not exceeded significantly until new facilities, now under construction, begin operating.

January Washer Sales Decline

FACTORY sales of standard-size household washers in January totaled 177,900 units, compared to 183,700 in December, a decrease of 3 per cent, and 50.6 below the 360,445 in January, 1948, according to industry-wide figures announced by the American Washer & Ironer Manufacturers' Association.

Sales of ironers aggregated 28,000 in January, compared to 26,000 in December, an increase of 7.7 per cent, and a drop of 30.3 per cent from 40,192 in January, 1948.

Steel Credit Policies

Unchanged though mills are watching developments closely. Customers still pay promptly

WITH business noticeably slower in some areas of the metalworking industry, steel producers are watching the credit position of their customers more closely. Steel credit men are aware of the possibility some accounts may experience financial difficulties should sales volume fail to respond favorably in a buyers' market.

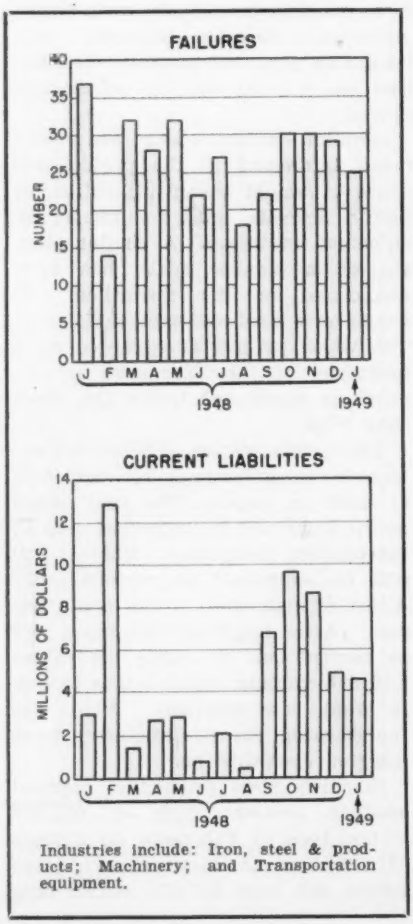
This awareness, however, has not yet affected basic credit policies in the steel industry since as yet there has been little cause for concern over the average customer's ability to pay. Most steel buyers are still in sound financial position although a few may have gone overboard a bit on inventories and as a result may be somewhat pinched for working capital.

Still Paying Promptly—Steel credit men report that times have been so good until recently they have not had to take poor credit risks and they are still in better shape in this respect than normally. In the main, companies which in the past discounted their bills continue to do so, while those which traditionally pay up in 30 days are settling as heretofore.

In numerous instances consumers have reduced new orders and have peddled excess inventories in line with reduced operating schedules. This has strengthened their liquid cash position, for the moment at least. In addition, with all customers increasingly cautious as to inventories, demand for short-term bank loans has fallen off.

Failures Not Alarming—Few business failures of consequence have been reported in metalworking lines since the letdown in business activity first became noticeable several months ago. As shown in the accompanying chart (based on data by Dun & Bradstreet), the failures and liabilities record in steel and metalworking over recent months has not been alarming. For the most part, it appears, the increase in business failures has been largely in retail and service trades.

While the steel mills view the credit situation with relatively little concern, the same cannot be said of steel warehouse operators. Dealing with smaller volume consumers whose cash positions presumably are not as strong as mill customers, warehouse credit men notice an increase in the number of accounts extending their payments. This, some warehousemen think, is indicative of a return to more normal business.



Industries include: Iron, steel & products; Machinery; and Transportation equipment.

Gas Appliance Makers To Cut

GAS range and water heater producers, convinced that peak volume ended last year and cognizant of signs of a returning buyers' market, will cut this year's production, James I. Gorton of Gas Appliance Manufacturers Association has disclosed.

Industry expects to ship a minimum of 2.3 million ranges this year, compared with 2.8 million in 1948, the record year. The minimum estimate for 1949 water heater shipments stands at 1 million, as against 1.5 million last year and 1.8 million in 1947, the alltime peak.

Plant To Close Temporarily

NASHVILLE Corp., subsidiary of the Avco Corp., announced its Nashville, Tenn., plant probably would be closed down for six weeks or more after Mar. 15, when bus manufacturing equipment was scheduled to be moved to Philadelphia.

It is expected the plant will resume operations in about six weeks producing consumer goods such as ranges and deep-freeze units.

A SPECIAL REPORT BY THE EDITORS OF STEEL A PENTON PUBLICATION PENTON BUILDING, CLEVELAND 13, OHIO

March 21, 1949

How Much Steel Capacity?

Presented here is the thinking of business, government and labor on the much-debated question of how much steelmaking capacity is required to support the national economy—now and in the future. Is capacity sufficient or should it be 100, 110 or 130 million tons?

HOW MUCH STEEL CAPACITY? Few questions relating to the national economy have provoked more discussion and inquiry on the part of business, labor and government during the past few years.

While the answer may be provided at least partially by a leveling in demand for steel products over the next few months, the question is likely to be debated for some time to come, especially if labor and government pursue the theory that a steel industry operating at capacity is the foundation for "full employment."

For that reason, this article summarizes and analyzes some of the current and recent thinking pertaining to steelmaking capacity as it relates to production and prospective consumption.

For the first time, also, STEEL presents here the results of a careful investigation made by William C. Buell Jr., one of the country's outstanding authorities on the operating and marketing problems of the steel industry. Mr. Buell is senior consultant of Arthur G. McKee & Co., Cleveland, internationally well-known in the steel plant engineering and construction fields.

Wartime Question — The question of how much steelmaking capacity was first brought up at the outset of World War II when it was indicated that the steel industry could not provide sufficient steel for projected military requirements. An additional 14 million tons of steelmaking capacity financed by both government and the steel industry during the five years beginning with 1940 brought the total up to record peak of 95.5 million tons on Jan. 1, 1945.

Some of the equipment drafted for use during the war could not be economically operated under the most favorable peacetime conditions. Therefore, the industry dropped net capacity of 3.6 million tons during 1945, making the total as of Jan. 1, 1946, 91.9 million. In the meantime, the industry was launching a rehabilitation and expansion program which will have involved spending $2.1 billion by the end of 1949 and an increase of some 7 million tons in steelmaking capacity to 98.3 million tons.

The Trend—The chart, Fig. 1, shows the trend in steel ingot capacity and production for the past 48 years, as well as the growth in population during the same period. These three trend lines indicate that there has been plenty of leeway—on the average—between production and capacity on one hand and population growth on the other.

The linear production trend line in the chart was computed for the 1900-48 period by the usual least squares method. It simply shows the general direction in which production is heading. Beginning with a value of 38,671,100 tons for 1900, the line goes up at the rate of 223,400 tons per year to 49,394,200 tons for 1948. Projection of the line results in a figure of 49,841,000 tons for 1950, 50,958,100 tons for 1955 and 52,075,100 tons for 1960.

This purely "mechanical" line, of course, takes no other factors into consideration and is shown as a matter of interest and for possible comparison with the other data presented here.

Incidentally, STEEL published a chart July 4, 1932, p. 11, showing the trend in per capita production

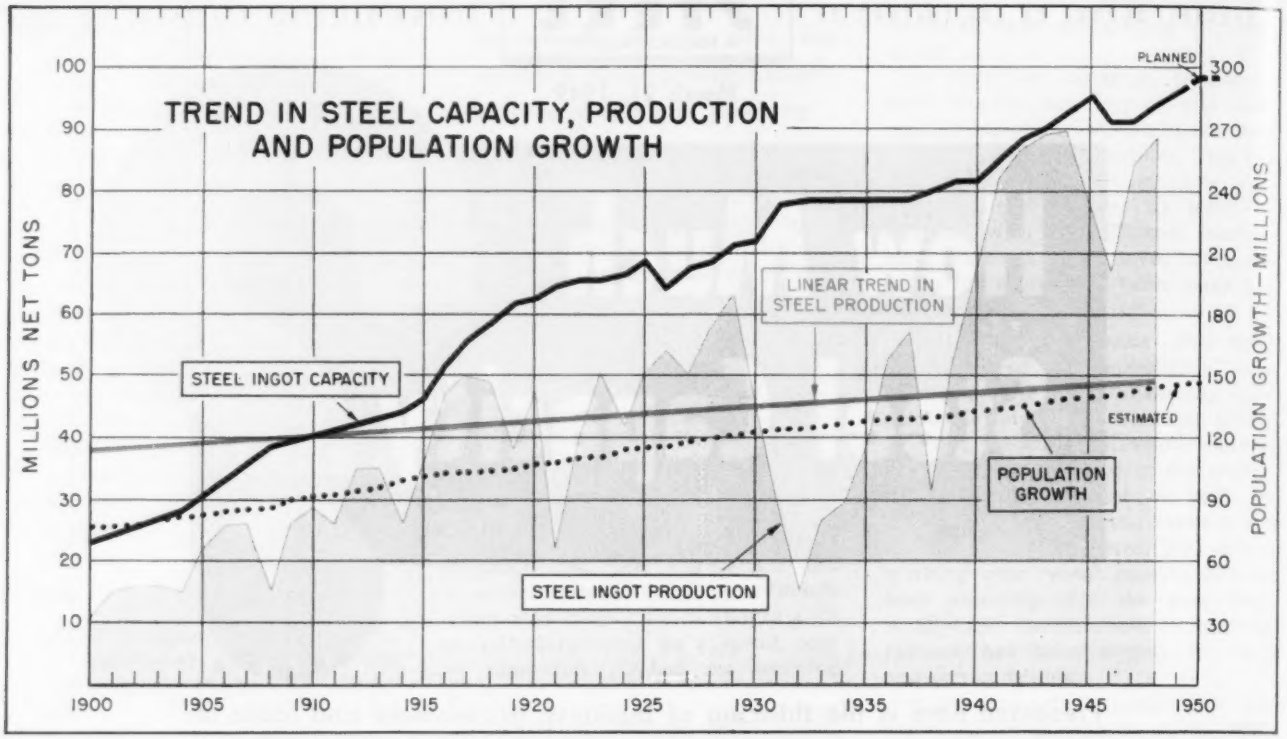


Fig. 1—This chart shows the long-term trend in steelmaking capacity and production and the growth in the nation's population. The linear trend line, determined by the "least squares" method for 1900 through 1948 shows the direction in which production is pointing. Extension of the line indicates 49.8 million tons for 1950, 51 million for 1955 and 52.1 for 1960

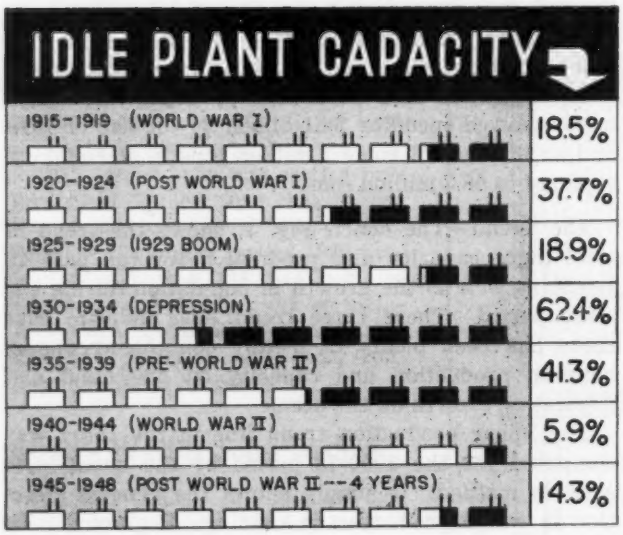


Fig. 2—For long periods, this chart shows, the steel industry has had a large portion of its facilities standing idle for lack of business. In determining practical capacity, or 100 per cent, the industry makes an average allowance of 12½ points in capacity for furnace down-time for maintenance, rebuilding, etc.

with a least squares line for 1900-29. At that time, a per capita production of 1200 pounds was indicated for 1940 or a total of 79,200,000 tons. Actual production in 1940 was 66,982,686 tons or at the rate 82.1 per cent of capacity.

What is Capacity?—In any discussion of capacity, it is important to know just what this term means. Actually, a steelmaking plant very seldom operates at full theoretical capacity since one or more furnaces usually are down for rebuilding or repairs. Each plant therefore determines how much steel its furnaces can make under ideal conditions and then makes an allowance of 12½ per cent for furnace down time. The net figure is regarded as 100 per cent and it means that a plant, and, in fact, the entire industry can operate for short periods at over 100 per cent of rated capacity.

Feast or Famine — Historically, steel has been known as a "feast or famine" industry. Over the years for which records have been kept, it has very seldom operated at any where near practical capacity. In the first world war, operations hit a peak of 93.4 per cent in 1916 and never exceeded that point until 1941 when the rate averaged 97.3 per cent. The 1929 peak was 88.5 per cent but three years later the industry was down to 19.5.

The chart, Fig. 2, shows that in the five years ending with 1919, or World War I, unused steel-

making capacity averaged 18.5 per cent. Over a third of capacity was idle in the 5-year postwar 1920-24 period, the exact figure being 37.7 per cent. Average for the five years ending with boom-year 1929 was 18.9 per cent. In the 5-year depression period, 1930 through 1934, an average of 62.4 per cent of capacity was inactive. Even in the five years ending with 1939, idle capacity amounted to 41.3 per cent. In the war years, 1940 through 1944, only 5.9 per cent of capacity was idle. The current 5-year period ending with 1949, of course, will show an increase in idle capacity, due mostly to strikes,

With these figures in mind, the steel industry finds that it can justifiably view with considerable skepticism some of the estimates of capacity required to support full employment. In addition, it recalls these factors which have contributed to the postwar steel shortage:

1—Export of 18 million tons of scrap to Japan, Italy and other foreign countries in the years immediately prior to World War II.

2—Loss in the war of some 125 million tons of metallics in the form of military equipment now at the bottom of the sea, rusting away in foreign countries or otherwise unreturnable as scrap.

3—Improved manufacturing methods which have resulted in smaller production of scrap.

4—More alloy-contaminated scrap which can be used in making only certain types of steel.

5—Less scrapping of "durables" such as industrial equipment and automobiles due to the general shortage of materials and which normally would have long since been junked.

6—Loss of at least 20 million tons of steel through strikes in the steel and various other related industries.

Ingots and Finished Steel—Steel ingots or "raw" steel, of course, must be rolled, drawn or otherwise processed into the various forms such as sheets, bars, structural shapes, plates, wire and the like for fabrication by industrial plants into finished products for the consumer. The various steps in processing result in a considerable loss in the form of scrap—usually about 25 per cent—which is returned to steelmaking furnaces for remelting. In 1948, 65,973,138 tons of finished steel products were realized from a production of 88,533,729 tons of ingots.

Evolution in Steel Requirements—Over the years there has been a definite trend toward use of stronger, lighter steel sections for many purposes. For instance, the low alloy, high tensile steels are being used more and more in the construction of such common items as railroad cars. And, literally thousands of items in everyday use are assembled by welding or with fasteners from light steel stampings. On the average, a pound of steel goes farther than it did a decade or two ago and this trend is likely to continue. This factor must not be overlooked in considering prospective per capita consumption of steel.

Higher Economic Plateau?—The record shows that the steel industry encountered no difficulty in satisfying peacetime demand up to the present postwar period. The question now arises as to whether the national economy has been elevated to a higher plateau which has resulted in a sudden—and permanent—upward surge in per capita steel requirements, or whether there has simply been a maladjustment of supply and demand which now is beginning to right itself.

It must be remembered that there is no exact historical precedent for the current postwar situation in steel. World War I required huge tonnages of steel for ships, guns and ammunition, etc., but there still was a substantial amount left for the civilian economy. On the other hand, the almost complete mechanization of the armed forces in World War II made it impossible to supply more than the barest essential civilan steel requirements. It meant that the vacuum of the war years had to be filled—but not entirely—for demand is not 100 per cent cumulative. An individual, for example, who ordinarily might have purchased three automobiles during the

HOW STEEL CAPACITY AND POPULATION HAVE EXPANDED

	Steelmaking Capacity Jan. 1 (Net Tons)	Steel Production (Net Tons)	Per Cent Of Capacity	U. S. Population (Millions)
1951	98,843,930*	.....	...	....
1950	98,303,930*	.....	...	†147.0
1949	96,120,930	.....	...	....
1948	94,233,460	88,533,729	94.0	146.1
1947	91,241,250	84,894,071	93.0	144.0
1946	91,890,560	66,602,724	72.5	141.2
1945	95,505,280	79,701,648	83.5	139.6
1944	93,854,420	89,641,600	95.5	138.1
1943	90,589,190	88,836,512	98.1	136.5
1942	88,886,550	86,031,931	96.8	134.7
1941	85,158,150	82,839,259	97.3	133.2
1940	81,619,496	66,982,686	82.1	132.0
1939	81,828,958	52,798,714	64.5	130.9
1938	80,185,638	31,751,990	39.6	129.8
1937	78,148,374	56,636,945	72.5	128.8
1936	78,164,300	53,499,999	68.4	128.1
1935	78,451,930	38,183,705	48.7	127.3
1934	78,128,416	29,181,924	37.4	126.4
1933	78,614,403	26,020,229	33.1	125.6
1932	78,780,913	15,322,901	19.5	124.8
1931	77,257,803	29,058,961	37.6	124.0
1930	72,985,406	45,583,421	62.5	123.1
1929	71,438,516	63,205,490	88.5	121.8
1928	68,840,912	57,729,481	83.9	120.5
1927	67,236,117	50,327,407	74.9	119.0
1926	64,750,035	54,089,014	83.5	117.4
1925	68,473,222	50,840,747	74.2	115.8
1924	66,563,515	42,483,772	63.8	114.1
1923	65,682,014	50,336,940	76.6	111.9
1922	65,426,682	39,875,277	60.9	110.1
1921	64,262,027	22,157,853	34.5	108.5
1920	62,313,591	47,188,886	75.7	106.5
1919	61,020,669	38,831,779	63.6	105.1
1918	58,846,418	49,797,923	84.6	104.5
1917	55,567,555	50,467,880	90.8	103.4
1916	51,282,314	47,906,522	93.4	102.0
1915	46,249,146	36,009,161	77.9	100.5
1914	44,451,977	26,334,594	59.2	99.1
1913	.....	35,056,979	...	97.2
1912	.....	35,001,459	...	95.3
1911	.....	26,517,238	...	93.9
1910	.....	29,226,309	...	92.4
1909	.....	26,829,624	...	90.5
1908	38,237,343	15,706,037	41.1	88.7
1907	.....	26,166,105	...	87.0
1906	.....	26,205,913	...	85.4
1905	.....	22,426,821	...	83.8
1904	28,213,147	15,523,074	55.0	82.2
1903	.....	16,279,175	...	80.6
1902	.....	16,740,920	...	79.1
1901	24,039,064	15,090,426	62.8	77.6
1900	.....	11,410,928	...	76.1

Steel industry figures from American Iron & Steel Institute; population figures from U. S. Bureau of Census.
* Planned. † Projected.

elapsed time of the war still represented the market for just one car when it ended.

In attempting to determine future trends in steel requirements, it is the accepted practice of most prognosticators to use per capita consumption or per capita demand in terms of steel ingots produced. Production can be used as a measure of consumption on the basis that all steel made eventually is used.

The Sykes Report

In studying the prospective trend in steel demand, Wilfred Sykes of the Inland Steel Co., Chicago, observed that per capita consumption of steel in ingot form remained fairly constant during the 30 years prior to the last war. There were wide fluctuations upward and downward during the business cycles, but the overall per capita, long term demand remained practically steady, he found.

The average per capita domestic demand for steel, based on ingots produced from 1911 to 1920, was 666 pounds and from 1921 to 1940, it was 668 pounds. In the 10 years from 1921 to 1930, when there was a period of considerable expansion and rehabilitation following the first World War, per capita domestic demand averaged 770 pounds. In the decade from 1931 to 1940, the depression period, per capita demand dropped to 576 pounds.

"If we make an optimistic assumption that the average annual per capita domestic consumption of ingot steel will approximate 700 pounds, or 5 per cent greater than the annual average for the preceding 30 years, and an average export demand equivalent to 10 per cent of the domestic demand, the average demand for ingot steel would approximate 54 million tons for the present period with an average demand by the year 1975 of 63 million tons," according to Mr. Sykes. "Certainly on the basis of average operation, we can conclude that the present ingot capacity of over 90 million tons will be adequate to meet the needs for some time to come."

The period 1920 through 1940 was selected for analysis by Mr. Sykes. Ingot production for each year was analyzed to exclude export tonnages, following which the remaining tonnage was reduced to the per capita average in order that appropriate recognition could be given to the increased demand of a growing population.

Prewar Peak in 1929—Mr. Sykes' chart, Fig. 3, shows that greatest per capita demand in the 21-year period occurred in the decade immediately following the first World War when the average reached 770 pounds with a peak of 978 pounds per capita in 1929, whereas in the second decade of this period the average dropped to 576 pounds with a peak per capita of 838 pounds in 1940, which was influenced by prewar preparation.

Mr. Sykes does not attempt to estimate export demand but figures it might run about 6 million ingot tons per year. On the basis of anticipated peak domestic demand of 978 pounds, plus export requirements, Mr. Sykes figures that 1950 consumption of ingots would be 76,373,000 tons. Using the same 978-pound figure for 1955, plus exports, Mr. Sykes estimates 1955 consumption at 78,464,000 tons. Estimated population of 143,896,000 was used in determining the 1950 consumption figure and a population of 148,186,000 for 1955.

Mr. Sykes concludes that present maximum demand

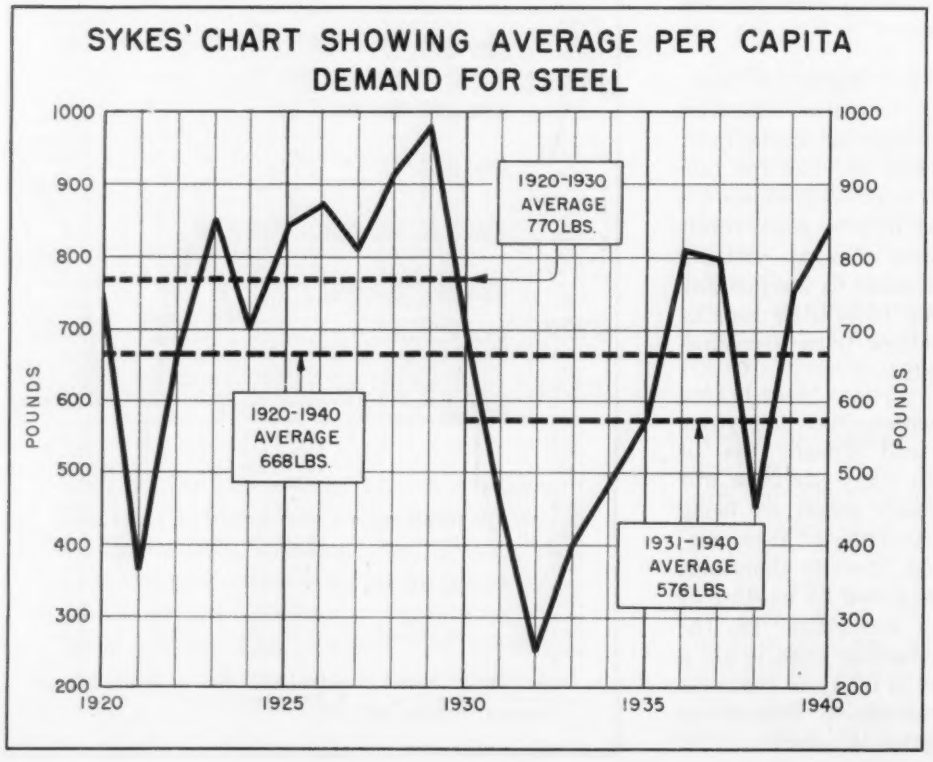


Fig. 3—In studying steel demand for a 21-year period, Wilfred Sykes of the Inland Steel Co., Chicago, found that peak demand was 978 pounds per capita. Based on population growth and this peak rate of demand, 1955 requirements would be 78.5 million tons

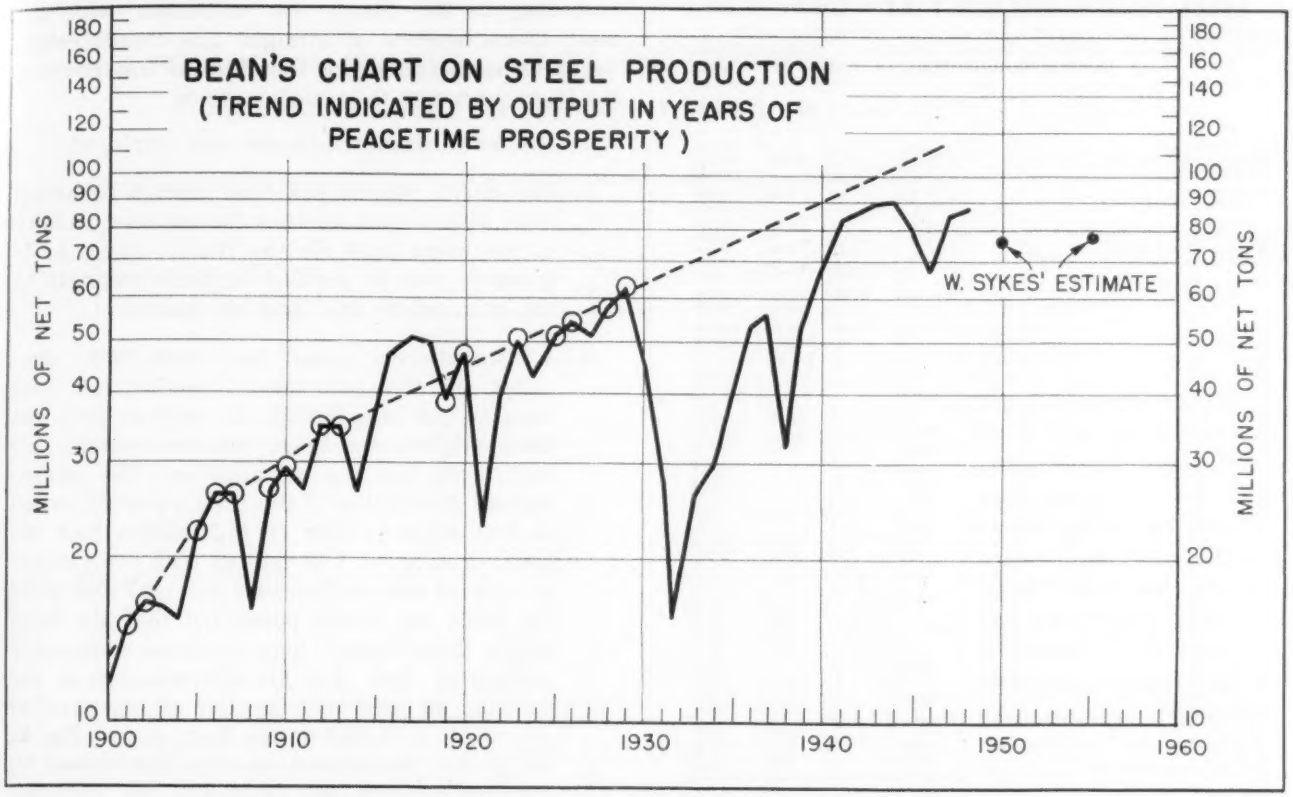


Fig. 4—Louis H. Bean, U. S. Department of Agriculture economist, figures that only prosperity years should be considered in projecting production required for full employment. On this basis, the trend line shows that about 130 million tons of steel will be needed to assure full employment in 1950, more in later years

is far above average and that for normal peacetime purposes a peak domestic demand of about 1000 pounds per capita can be anticipated which would add about 2 per cent to the above totals.

On the basis of anticipated population of 163 million in 1975, Mr. Sykes estimates maximum demand at about 90 million ingot tons, allowing 10 per cent for export. Such speculation is of "doubtful value," according to Mr. Sykes, since it is so far ahead in the future.

The Bean Report

Louis H. Bean, of the Department of Agriculture, presented one of the most controversial studies on prospective steel requirements before the steel Subcommittee of the Senate Committee to Study Problems of American Small Business. This report has been thoroughly analyzed by Bradford B. Smith, economist, United States Steel Corp., New York, and he also has arrived at some independent conclusions.

Mr. Bean concludes that well over 100 million tons of steel production are required annually and that failure to produce that much steel will cause serious unemployment. Mr. Bean found that in the prosperity years of 1920, 1923, 1926 and 1929 farm income amounted to $260 to $300 (at 1947 prices) for every ton of steel produced. In 1940 and 1941 it amounted to $230. Mr. Bean said that it probably is not stretching the fact of interdependence between farm and factory too much to say that for every ton of steel below the volume required for full employment, farmers now have a stake of at least $250 to $300. A shortage of 20 million tons in steel capacity required for full employment could, at the rate of $250 farm income per ton, mean a shortage in farm income of several billion dollars annually.

"Full Employment"—The chart prepared by Bean, Fig. 4, shows the trend in steel production from 1900 to 1947. Mr. Bean points out that in dealing with steel requirements for full employment interest should be concentrated in the trend of production in prosperity years. These were selected by Mr. Bean as being 1901 and 1902, 1906 and 1907, 1909 and 1910, 1912 and 1913, 1919 and 1920, 1923, 1925 and 1926, and 1928 and 1929. A straight line projection of this record suggests to Mr. Bean that the country would have needed about 80 million tons of steel in 1940 had that year been one of full employment such as 1929. The line also suggests that full employment in 1950 would require something over 100 million. (The chart shows 90 and 130 millions.)

Smith's Criticism

In analyzing this chart, Bradford Smith points out that it has a logarithmic vertical scale, "sometimes useful to skilled statisticians." Most people,

STEEL INGOT CAPACITY BY COMPANIES

(Capacity for production of ingots and steel for castings on Jan. 1, 1949, as reported before the Senate Committee to Study Problems of American Small Business; net tons)

Company	Open hearth	Bessemer	Electric	Total
Alan Wood Steel Co.	550,000			[1] 550,000
Allegheny Ludlum Steel Corp.	200,160		236,200	[2] 436,360
American Locomotive Co.	181,000			[2] 181,000
Armco Steel Corp.	2,148,000		365,000	2,513,000
Sheffield Steel Corp.	1,050,000			1,050,000
Total	3,198,000		365,000	[1] 3,563,000
Atlantic Steel Co.	165,000			[2] 165,000
Babcock & Wilcox Tube Co.			50,400	[2] 50,400
Barium Steel & Forge, Inc.	36,000			[2] 36,000
Bethlehem Steel Corp.:				
Bethlehem Steel Co.	12,812,000	572,000	158,000	13,542,000
Bethlehem Pacific Coast Steel Corp.	562,000		96,000	658,000
Total	13,374,000	572,000	254,000	[1] 14,200,000
Braeburn Alloy Steel Corp.			20,730	[2] 20,730
Byers Co., A. M.			75,000	[2] 75,000
Carpenter Steel Co.			81,360	[2] 81,360
Central Iron & Steel Co.	306,000		37,000	[2] 343,000
Colonial Steel Co.			7,020	[2] 7,020
Colorado Fuel & Iron Corp.	1,452,000			[1] 1,452,000
Columbia Tool Steel Co.			6,600	[2] 6,600
Connors Steel Co.			60,960	[2] 60,960
Continental Steel Corp.	364,000			[2] 364,000
Copperweld Steel Co.			554,400	[2] 554,400
Crucible Steel Co. of America	930,000		341,070	[1] 1,277,130
Disston & Sons, Inc., Henry			25,000	[2] 25,000
Edgewater Steel Co.	137,650			[2] 137,650
Empire Steel Co.	390,320			[2] 390,320
Erie Forge & Steel Co.	128,950			[2] 128,950
Erie Forge Co.	85,000			[2] 85,000
Firth Sterling Steel & Carbide Corp.			20,040	[2] 20,040
Follansbee Steel Corp.	136,080			[2] 136,080
Ford Motor Co.	1,115,110		317,080	[1] 1,432,190
Granite City Steel Co.	620,000			[2] 620,000
Harrisburg Steel Corp.	109,750			[2] 109,750
Heppenstall Co.	39,580		6,700	[2] 46,280
Ingersoll Steel Division of Borg-Warner Corp.			24,000	[2] 24,000
Inland Steel Co.	3,400,000			[2] 3,400,000
Isaacson Iron Works			104,400	[2] 104,400
Jessop Steel Co.			48,230	[2] 48,230
Jones & Laughlin Steel Corp.	3,897,000	918,000	1,500	[1] 4,816,500
Joslyn Manufacturing & Supply Co.			37,500	[2] 37,500
Judson Steel Corp.	76,500			[2] 76,500
Kaiser Co., Inc.	980,000			[1] 980,000
Keystone Steel & Wire Co.	302,400			[2] 302,400
Knoxville Iron Co.			38,000	[2] 38,000
Ladlede Steel Co.	226,020			[2] 226,020
Latrobe Electric Steel Co.			12,000	[2] 12,000
Lukens Steel Co.	624,000			[2] 624,000
McLouth Steel Corp.			[3] 120,000	[2] 120,000
Mesta Machine Co.	85,000		20,000	[2] 105,000
Midvale Co.	430,830		92,940	[2] 523,770
National Forge & Ordnance Co.			25,000	[2] 25,000
National Steel Corp.:				
Great Lakes Steel Corp.	2,160,000			2,160,000
Weirton Steel Co.	2,040,000			2,040,000
Total	4,200,000			[1] 4,200,000
National Supply Co.			40,950	[2] 40,950
Newport News Shipbuilding & Dry Dock Co.			7,500	[2] 7,500
Newport Rolling Division of International Detroit Corp.	413,100		86,900	[2] 500,000
Northwest Steel Rolling Mills			32,400	[2] 32,400
Northwestern Steel & Wire Co.			321,000	[2] 321,000
Oregon Steel Mills			66,100	[2] 66,100
Pacific States Steel Corp.	48,000		128,400	[2] 176,400
Phoenix Iron Works Corp.	260,000			[2] 260,000
Pittsburgh Steel Co.	1,072,000			[1] 1,072,000
Portsmouth Steel Corp.	720,000			[1] 720,000
Reconstruction Finance Corp.			[4] 360,000	[2] 360,000
Republic Steel Corp.	7,175,000	665,000	760,000	[5] 8,600,000
Roebling's Sons Co., John A.	204,870			[2] 204,870
Rotary Electric Steel Co.			340,000	[2] 340,000
Sharon Steel Corp.	1,600,000		72,000	[1] 1,672,000
Simonds Saw & Steel Co.			21,600	[2] 21,600
Standard Steel Works	149,280		[6] 20	[2] 149,300
Stanley Works	188,280			[2] 188,280
Texas Steel Co.			22,320	[2] 22,320
Timken Steel & Tube Division of Timken Roller Bearing Co.	201,600		345,600	[2] 547,200
Union Electric Steel Corp.			21,000	[2] 21,000
United States Steel Corp.:				
American Steel & Wire Co.	1,782,000			1,782,000
Carnegie-Illinois Steel Corp.	20,039,700	1,284,000	418,300	21,742,000
Columbia Steel Co.	560,000		12,000	572,100
Geneva Steel Co.	1,283,400			1,283,400
National Tube Co.	2,202,000	846,000		3,048,000
Tennessee Coal, Iron & R. R. Co.	2,850,000			2,850,000
Total	28,717,200	2,130,000	430,300	[1] 31,277,500
Universal-Cyclops Steel Corp.			54,120	[2] 54,120
Vanadium-Alloys Steel Co.			11,910	[2] 11,910
Vulcan Crucible Steel Co.			9,600	[2] 9,600
Washburn Wire Co.	60,000			[2] 60,000
Wheeling Steel Corp.	1,200,000	336,000		[1] 1,536,000
Wickwire Bros.	38,000			[2] 38,000
Wisconsin Steel Co.	900,000			[1] 900,000
Worth Steel Co.	460,000			[2] 460,000
Youngstown Sheet & Tube Co.	3,512,000	570,000		[1] 4,082,000
Grand total	84,817,040	5,191,000	[6] 6,112,890	96,120,930

[1] Ingots.
[2] Steel ingots.
[3] Capacity of electric furnaces which were purchased from the Government and moved from East Chicago, Ind., to Trenton, Mich.
[4] Idle capacity of Government-owned furnaces formerly operated by Republic Steel Corp.
[5] Capacity of crucible ingots.
[6] Includes 20 tons for capacity of crucible ingots.

Annual Capacity of Steel for Castings Jan. 1, 1949

Company	Open hearth	Electric	Total
Allegheny Ludlum Steel Corp.	10,080	7,500	[1] 17,580
Bethlehem Steel Co.	38,800	24,000	[2] 62,800
Colorado Fuel & Iron Corp.	3,300		[2] 3,300
Crucible Steel Co. of America	1,800	1,280	[2] 3,080
Erie Forge Co.	40,000		[1] 40,000
Ford Motor Co.		151,720	[2] 151,720
Jessop Steel Co.		2,670	[1] 2,670
Jones & Laughlin Steel Corp.	10,000	1,500	[2] 11,500
Mesta Machine Co.	40,000		[1] 40,000
Midvale Co.		4,500	[1] 4,500
National Supply Co.		6,300	[1] 6,300
Newport News Shipbuilding & Dry Dock Co.		3,750	[1] 3,750
Portsmouth Steel Corp.	1,800		[2] 1,800
Standard Steel Works Co.	35,840		[1] 35,840
Texas Steel Co.		4,600	[1] 4,600
United States Steel Corp.:			
Carnegie-Illinois Steel Corp.	35,700	5,500	41,200
Columbia Steel Co.	15,500		15,500
Tennessee Coal, Iron, & R. R. Co.	12,000		12,000
Total	63,200	5,500	[2] 68,700
Grand total	244,880	213,380	458,260

[1] Steel ingots.
[2] Ingots.

according to Mr. Smith, are unfamiliar with the basic characteristics of straight line trends established on such scales and therefore he has redrawn the Bean chart with these modifications:

1—Ordinary arithmetic scales are employed.

2—The chart, Fig. 5, has been carried backward from 1900 to see whether the assumed validity of his trend lines for the future, where he is guessing, can be verified by their propriety to the past, where the facts are known.

3—A "statisticians' trend" line (1901-1929) computed by the conventional method of least squares has been added. It employs only the data selected by Bean, but incorporates all such data into one computation. The mathematical description of the least squares method is that from a value of 14.2 million tons for 1901, it rises by 1.56 million tons per year to a value of 85.9 million tons for 1947 and 90.58 for 1950. Mr. Smith points out that Mr. Bean shows three "trend" lines for three consecutive periods of time. For his determination of the first line he used only the data of four selected years—those dotted on the Bean chart (Fig. 4) as circles. The second also was determined by the data of only four years and the third line appears to have been determined by the data of eight selected years in the period 1912 to 1929 inclusive.

These trends appear as straight lines on Mr. Bean's chart. Mr. Smith, in converting his diagram to arithmetic scale, shows them as compound interest types of curves which rise with increasing acceleration. The solid lines in the Smith chart are based on Mr. Bean's figures. The projections forward and backward made by Mr. Smith appear as dotted lines.

Smith attacks Bean's projections on the basis that only the extreme high points in an economic series notable for the comparative violence of its fluctuation were taken. Said Mr. Smith, "His high point trend indication of 130 million tons of needed steel production in 1950 has no more validity than a trend fitted to the low points of 1914, 1921, 1932, 1933, 1934, 1935 and 1938. This last would come out with an indication that steel demand in 1950 should be nearer 30 than 130 million tons."

Mr. Smith said further, "In statistical literature, I know of no significant instances where a trend has been projected further into the future than it has been calculated for in the past—except possibly as a classroom illustration of the danger of doing so."

Bradford Smith's Conclusions—In Mr. Smith's judgment, the characteristics of long-term growth in most major industries are: First, there is a period of discovery and development followed by rapid, market finding expansion. That is followed, in turn, by a period of slower growth as a nation discovers what proportion of its per capita effort it wishes to devote to the particular industry, in light of its product's utility and cost."

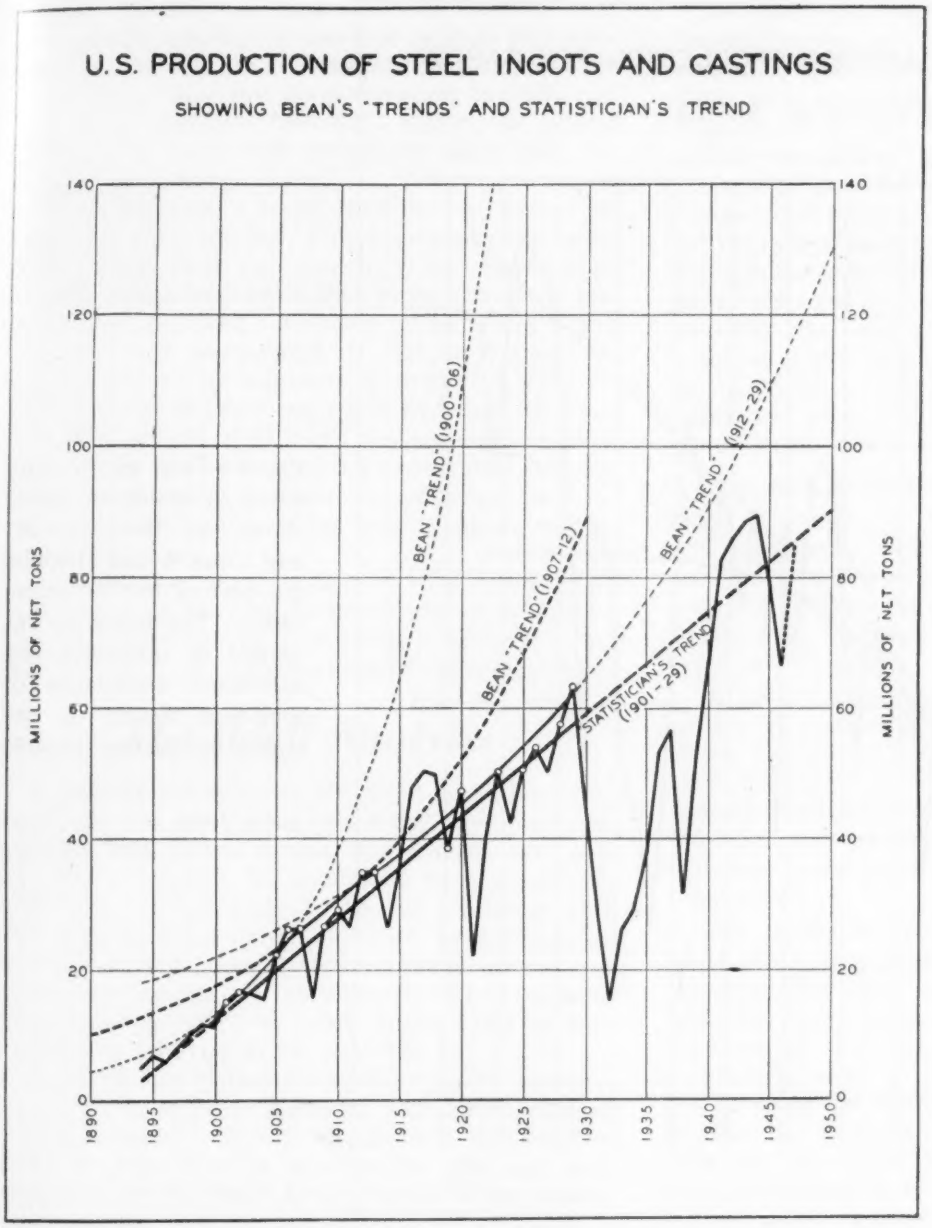


Fig. 5—Bradford B. Smith, U. S. Steel economist, has redrawn the Bean trend lines (see text) using arithmetic scales. He also has added a "statistician's trend" or least squares line for 1901-29. Since the depression years were not included in computing this least squares line, higher projections are indicated than by the 1900-48 line in Fig. 1

Mr. Smith expects that the growth trend in per capita steel demand cannot, in good sense, be as rapid now as in the heyday of discovery and development. The possibility of further large scale innovations in steelmaking should not, of course, be precluded—no one knows the future and it is always full of surprises. Low cost, high grade ores are not an inexhaustible resource, he says. As they are used up, much ingenuity and resourcefulness must go into the development of lower grade ores. Rising trends in steel production therefore face, in contrast to past periods, relatively greater cost and quality deterrents.

Mr. Smith also points out that there are other reasons for less rapid advances in the "normal" trend of per capita steel needs. For example, it should never be forgotten that *steel is durable.* Being durable, new steel production adds to existing inventories. Subtractions occur by corrosion, wear and abandonment but there is much reuse as scrap. The industry continuously and competitively improves the resistance of steel to corrosion and wear. The new steels are stronger and less tonnage is required for many purposes.

For comparison, the chart, Fig. 6, on steel ingot and casting production per capita, shows both the Bean "trend" and curves A and B developed by Mr. Smith. From 1900 to 1912, the Bean line is curved, rising by smaller increments in successive years. From 1912 to 1929, the line is drawn straight and projected to 1950. On the basis of full employment in 1950, Mr. Bean concludes that around 1400 pounds per person would be required with production of 100 million tons or more.

Lines A and B are part of the "S" curve family which Mr. Smith finds are reasonably appropriate to production trends over the past half century. These curves, determined mathematically, are regarded by Mr. Smith as the minimum and maximum boundaries of long-term trends in per capita production of steel. For 1947, the calculations repre-

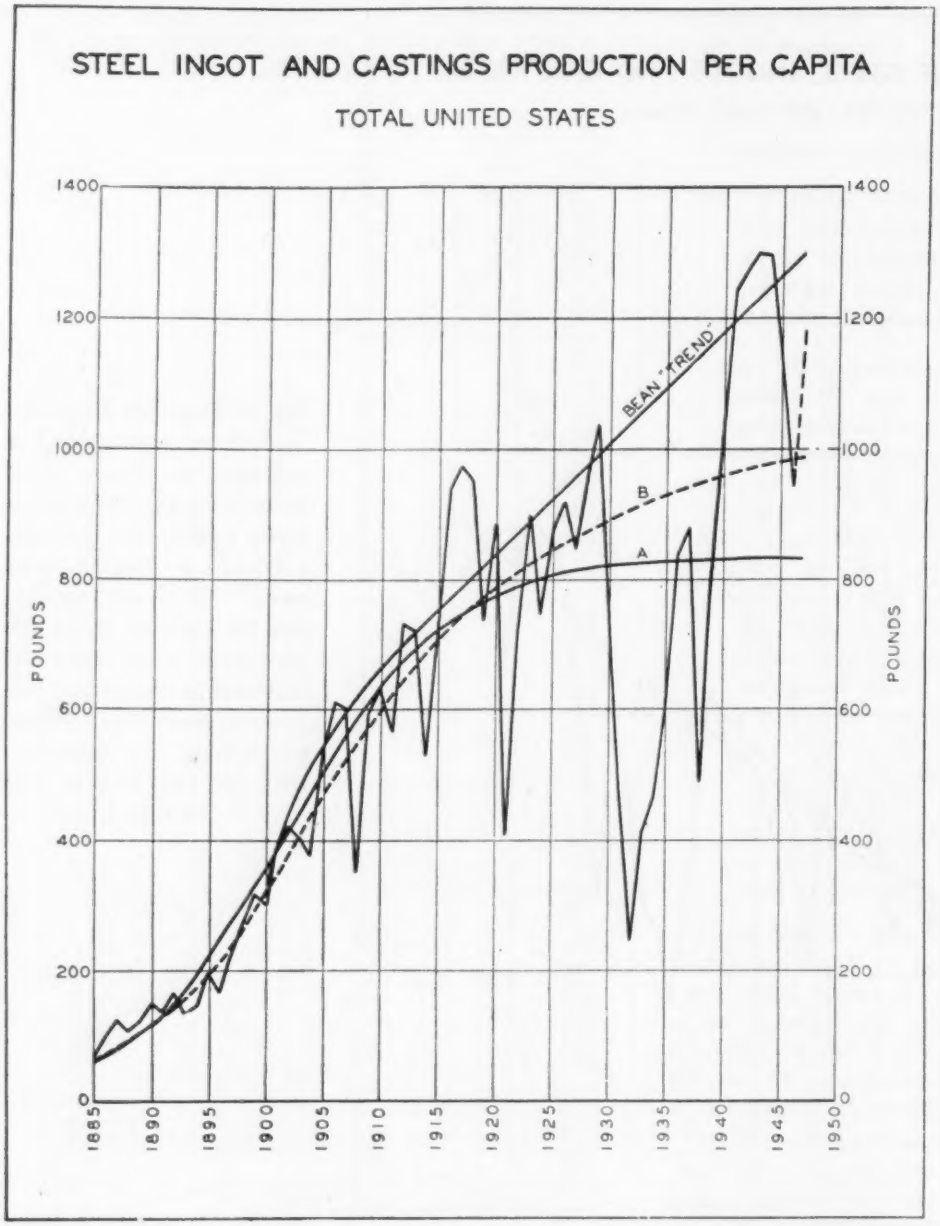


Fig. 6—This chart, prepared by Bradford Smith, shows the Bean "trend" and Lines A and B which are part of the "S" curve family. The latter are regarded as minimum and maximum boundaries of long-term trends in per capita production of steel

sented by curves A and B are approximately 830 and 985 pounds, respectively. For a population of 143 million, these amounts represent approximately 59 million tons and 71 million tons of demand.

Mr. Smith makes no predictions as to anticipated requirements for the years ahead. As he explained to STEEL, "The presence of the two lines is an attempt graphically to illustrate my notion that drawing any one line is at best statistically hazardous and presents the appearance of accuracy and finality that is outside the realm of the probabilities."

However, an extension of "B" indicates a value of slightly less than 1000 pounds per capita for 1950, or 73 million tons of ingot demand based on population of 146 million. The per capita value for "A" would change very little, thus making the total ingot equivalent about 60.6 million tons. These figures compare with the industry's capacity of 96.1 million tons on Jan. 1, 1949, and planned capacity of 98.3 million tons on Jan. 1, 1950.

The Brubaker Report

Labor is squarely behind the "full employment—more capacity theory." As voiced by Otto Brubaker, director of research, United Steelworkers of America CIO, before the Steel Subcommittee of the Senate Small Business Committee on behalf of the United Steelworkers of America, labor has "no choice but to support a program of carefully planned expansion of the steel industry."

In Mr. Brubaker's opinion, "Steel has become the fountainhead of American prosperity. Upon its full flow depends the ability of our people to maintain full employment and to create the goods we and our worldwide customers so desperately need. The stream has been so bountiful in the past, and even in wartime, that it comes as a rude shock to realize its inadequacies today, and especially for the future."

Mr. Brubaker proposes that the government aid the steel industry in providing needed expansion

through low interest Reconstruction Finance Corp. loans. If the industry is unwilling to make necessary expenditures with this encouragement, there is no alternative except for the government to build and lease the necessary facilities. Failure to expand capacity, he feels, will eventually mean real depression and unemployment.

He quotes from a study made by the Bureau of Labor Statistics entitled "Full Employment Patterns, 1950" which finds that relatively full employment in 1950 means that 59 million persons must be employed, not including 1.5 million in the armed forces and 2 million unemployed. If full employment is based primarily on consumer expenditures for nondurable goods and services, which BLS calls its "consumption model," steel ingot requirements in 1950 will total 98 million tons. If full employment is based primarily on capital goods expenditures, its "investment model," 120 million tons of ingots will be needed next year.

Mr. Brubaker observes that if consumption is a combination of the two "models," real steel requirements in 1950 will lie somewhere between the two estimates or in the neighborhood of 110 million tons.

The Buell Analysis

In making his analysis, Mr. Buell decided to consider only the steel going into rolled steel products, such as bars, plates, shapes, sheets, strip, wire and the like. Therefore, he eliminated from consideration steel castings made by the steel industry and ordinarily included in the statistics. In determining domestic consumption of steel products, he also deducted net exports in terms of ingots. All of the data then were converted to a per capita basis as will be noted by referring to his chart, Fig. 7.

Mr. Buell has plotted the actual trend in capacity on a per capita basis beginning with 1900 and also shows a "capacity trend" for the next decade. The trend in population as reported for the past and estimated for the future by the Bureau of the Census also is shown.

The actual per capita trend in production, exports and use is indicated by the vertical bars, the top of each bar representing production, the bottom domestic use and the length of the bar itself net exports. In only two years, namely 1902 and 1903, did imports exceed exports. A line determined by graphic projection shows the general trend in production.

Capacity Per Capita Up—It will be observed that steel ingot capacity per capita rose from 619 pounds per person in 1901 to 1125 pounds in 1920, 1270 in 1947 and 1315 in 1948. Production rose from 389 pounds in 1901 to 864 pounds in 1920, 1180 in 1947 and 1226 in 1948.

Excepting for the war years, Mr. Buell finds that exports have never amounted to more than 10 per cent of total ingot production and the average has been about 5.5 per cent. He believes it is reasonable to assume that this figure will not be exceeded for the next few years, considering both economic and political conditions.

Mr. Buell observes that throughout the years the productive capacity of the steel industry has been constantly and substantially increased and has always been sufficient to meet forseeable demands. Capacity rose from 24 million tons in 1901 to 94 million tons on Jan. 1, 1949, representing an average increase of about 1.5 million tons annually. Mr. Buell comments as follows:

"The usual method of forecasting is by plotting a trend line of past average and projected production to include consideration of special circumstances surrounding abnormal and subnormal periods and the resultant curve should reflect a composite interpretation of the production of such years as may be considered as average and representative of a normal economic growth.

Long-Term Predictions Hazardous—"However, forecasts of trends for years to come should extend but a relatively short period into the future and unknown and should be extrapolated only on proven past performance rather than by any mathematical precepts or formulae. The curves shown (Fig. 7) conform to this plan.

"In 1900 the United States was at the threshold of an era of general industrial expansion which continued through 1915, with exception of the panic year, 1908. Production of steel increased sharply to satisfy demand resulting from a larger population and in fostering growing industry and commerce and as machines began to replace man as prime movers of production.

"The impact of World War I was the cause for rapid and substantial increase in ingot capacity that continued thereafter from about 1915 through 1940 and was far in excess of productive requirements even though they continued to increase. The drops in capacity noted in subsequent years were due to the rerating of existing equipment, the scrapping of obsolete facilities and to the deletion of steel castings for sale which previously had been included in the productive capacity statistics.

"Production of steel rode to new heights in three of the years of World War I, an abnormal condition, only to drop subnormally in the postwar recession of 1921 and to the extreme depths in the great depression of the early thirties. The recession of 1938 broke the upward trend which started in 1936 but continued with that exception to our entry into World War II late in 1941.

"The years between the World Wars, good or bad, marked the entry of common man into the steel market as a considerable purchaser of finished steel in terms of automobiles, refrigerators and a multitude of other appliances and gadgets made principally of steel and now considered necessary adjuncts to the abundant life. Thus, through the between-war years the per capita trend curve continued constantly upward though at a considerably reduced tempo as compared to the curve for 1900-1915.

No Surges Seen—"It seems improbable that within the next decade there should be found such an increased proportion of new outlets or application of durable consumer goods requiring steel that will

cause any substantial upward surge in the relatively stable trend line of the two decades prior to World War II. The average increase has been about 0.5 per cent per capita per year. In a gigantic and basic industry such as steel this represents a tremendous increase of producing facilities.

"The performance during the six years of accelerated production of World War II was remarkable but such a rate of period production cannot be expected to materially influence the requirements of actual postwar demands.

"During the late war, little if any steel was available for actual trade or consumer use. However, a considerable amount of steel that went into wartime capital facilities now is finding use in peacetime production and thus is serving to reduce constructional demands currently.

Some Demand Gone Forever — "Furthermore, a large part of the wartime unsatisfied consumer demand is gone forever. The individual who would have purchased three or four automobiles finds, after 9 years, that his accumulated demand is centered in the single unit. Therefore, widely quoted and publicized consumer demand tonnage can be reduced in the order of 60 to 70 per cent and it is believed that the trade and commerce requirements can also be modified, but probably to a lesser extent.

"If the case for the development of the consumer trend line (Fig. 7) is soundly made, then that line extrapolated from the latest available statistics indicates that on Jan. 1, 1950, the per capita average use of ingots, including the margin for export, would be in the order of 980 pounds per person. In other words, about 71.5 million net tons of ingot production would be required to supply the needs of 146 million inhabitants. This production, from about 98 million tons of capacity anticipated by the American Iron & Steel Institute, indicates an operating rate of 72 per cent. In the 34 years prior to 1948, the operating rate averaged only slightly more than 70 per cent.

"It becomes a fairly simple task to forecast the situation as it refers to capacity and production in 1955 and 1960 provided that within the next year or two the steel industry operates at around 75 per cent of capacity.

Buell's Forecast—"The following forecast is based on the latest estimates of the Census Bureau which indicates that the population will increase to 150 million in 1955 and to 154 million in 1960. An extrapolated addition to the trend line in Fig. 7 resolves a figure of 1025 pounds of steel per person for demand on Jan. 1, 1955 and 1070 pounds on Jan. 1, 1960. Ingot requirements would be 76.9 and 82.4 million tons, respectively. On the basis of 75 per cent of capacity operations, the indicated ingot capacity figure for Jan. 1, 1955 would be 102.5 million tons and for Jan. 1, 1960 it would be 109.9 million tons.

"Thus, if the steel industry is to keep up with future requirements in the coming decade, based on past experience, some 4.5 million tons of additional steel producing facilities must be ready for operation on Jan. 1, 1955 and still another 6 or 7 million tons five years later. The history of the past 48 years of steel industry management is one of progressive planning that is always allowed it to meet the maximum or emergency demand not only of our own nation but those of many other countries.

Capacity Margin 30 Per Cent—"The steel industry always has been willing to invest the capital neces-

Steel Ingot Capacity, Production, Exports and Consumption on a Per Capita Basis

(Data prepared by W. C. Buell Jr. Arthur G. McKee & Co., Cleveland)

	Capacity	Production	Net Exports	Use
1900		301	28	273
1901	619	389	21	368
1902		423	+3	426
1903		403	+4	407
1904	684	377	32	345
1905		519	31	488
1906		593	31	562
1907		580	31	549
1908	860	345	22	323
1909		578	28	550
1910		613	23	590
1911		553	52	501
1912		716	5	711
1913		706	64	642
1914	878	524	33	491
1915	895	708	88	620
1916	977	924	143	781
1917	1048	943	148	795
1918	1049	933	134	799
1919	1121	722	109	613
1920	1125	864	128	736
1921	1136	400	50	350
1922	1127	719	54	665
1923	1134	876	54	822
1924	1127	731	43	688
1925	1142	863	39	824
1926	1078	905	43	862
1927	1092	833	39	794
1928	1113	943	47	896
1929	1142	1013	53	960
1930	1140	722	33	689
1931	1209	460	13	447
1932	1226	242	3	239
1933	1218	408	10	398
1934	1228	459	21	438
1935	1226	597	17	580
1936	1211	823	22	801
1937	1200	872	53	819
1938	1223	485	34	451
1939	1238	802	49	753
1940	1241	1008	154	854
1941	1272	1239	123	1116
1942	1317	1278	135	1143
1943	1325	1300	131	1169
1944	1353	1293	113	1180
1945	1364	1142	96	1046
1946	1296	942	93	849
1947	1270	1180	129	1051
1948	1315	1226	83	1143

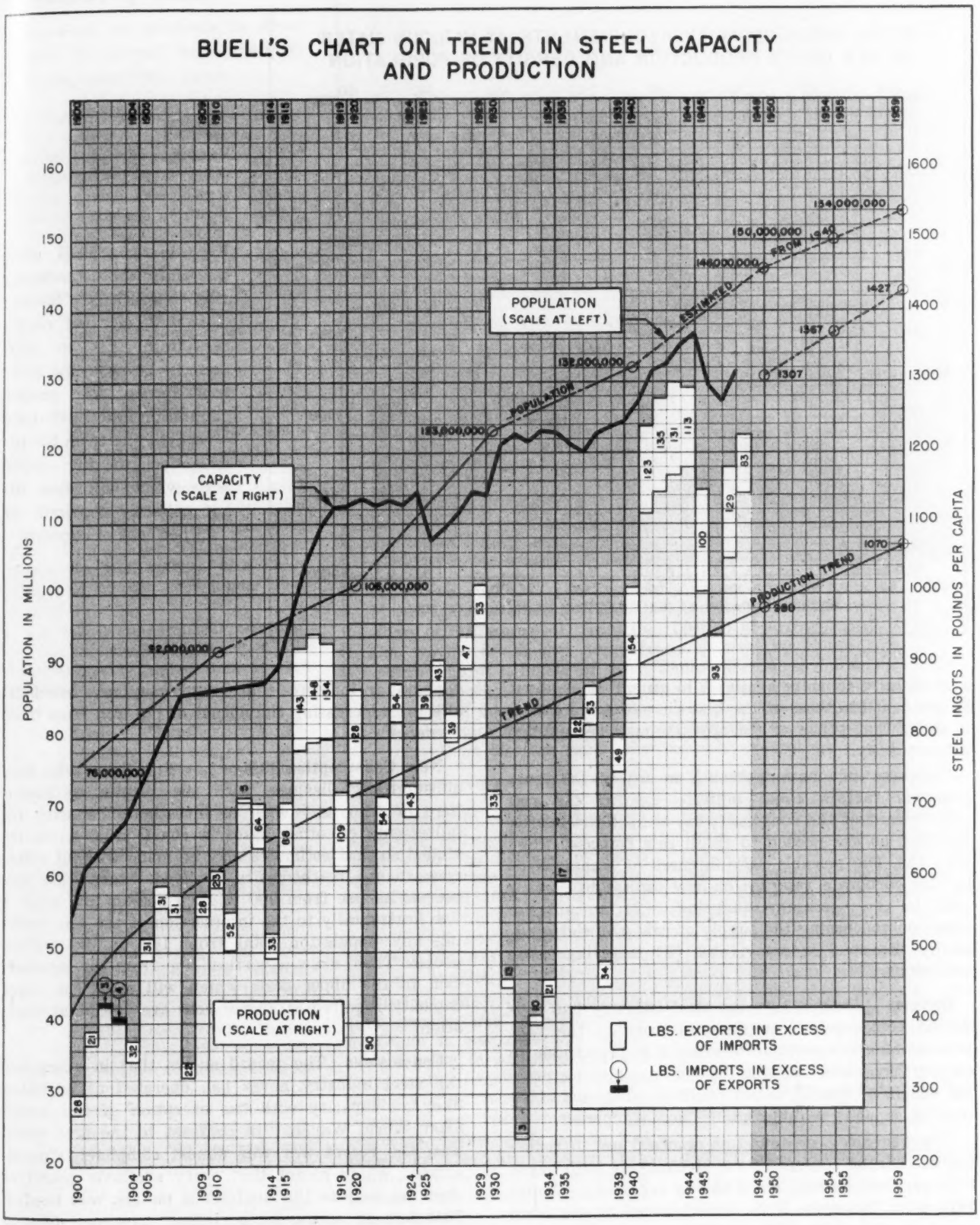


Fig. 7—William C. Buell Jr., senior consultant, Arthur G. McKee & Co., Cleveland, has prepared this chart showing trends in steelmaking capacity, production and consumption. It will be noted that prospective trends are indicated for both capacity and production. Tops of the vertical bars represent actual annual production of steel ingots on a per capita basis, the bars themselves net exports and the bottoms of the bars consumption or use. Numerical values used in preparing the chart are shown in the table on the opposite page. On the basis of 75 per cent operations, the industry may be expected to need 102.5 million tons of capacity by Jan. 1, 1955, and 109.9 by 1960. Per capita requirements are shown on the chart.

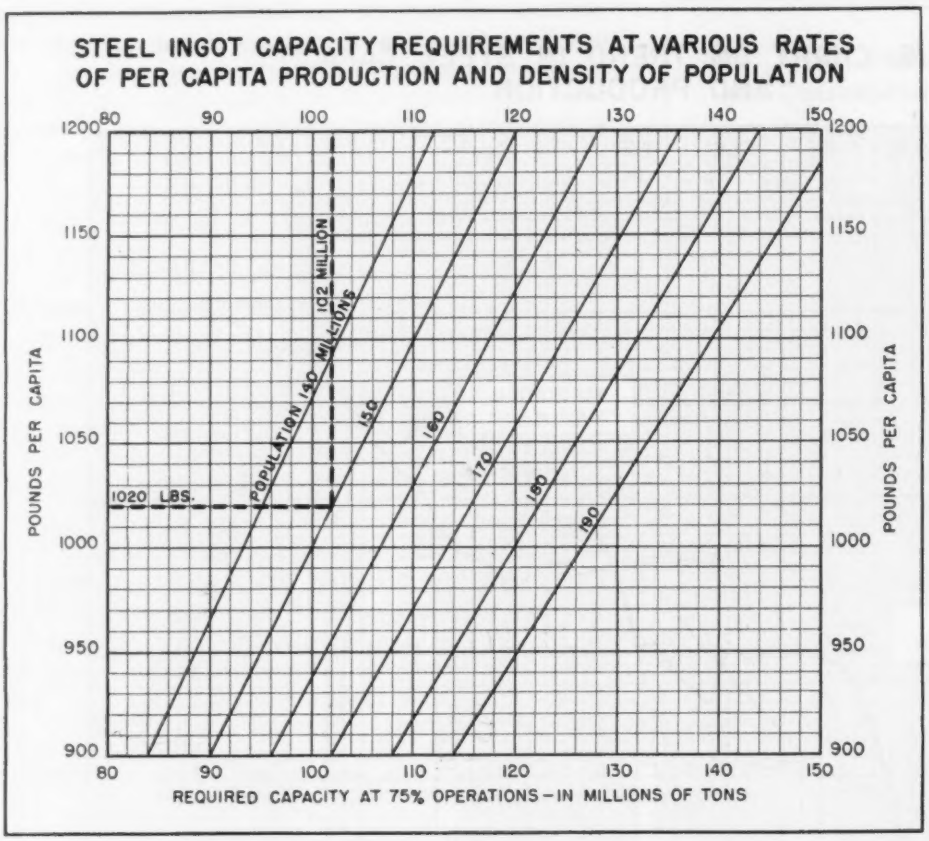


Fig. 8—Mr. Buell drew this chart for determining steel capacities. Simply start with any per capita use from 900 to 1200 pounds. Draw a line horizontally to the proper population line. Then draw a vertical line from the intersection to the upper scale which will show ingot capacity required at 75 per cent of capacity

sary to have capacity available to an extent of about 30 per cent in excess of the historic average demand, in order that peaks or emergencies may be satisfied without delay.

"Adverse influences operating on any of the three principal factors could militate against the full achievement of the consummation of such production facilities as are needed to fulfill this forecast. They are: (1) The possible unwillingness of management to risk corporate reserves or new capital to participate in the necessary financing; (2) an adverse situation concerning the supply of raw material needed by the steel industry, and (3) crippling labor conditions.

Oxygen—"Incidentally, the steel industry has conducted considerable experimental work in the past year or two to determine whether it is practicable to employ oxygen in speeding up the steelmaking process which, of course, would result in additional steelmaking capacity without adding new equipment.

"Oxygen has been found of practical use in reducing the carbon content of the steelmaking bath below 0.20 per cent carbon, when this is necessary. Above this point, however, it is more feasible to use lump iron ore as a reducing agent since there also is a metal recovery rate of about $16 a ton, which is an important cost factor.

"In the next few years, it is entirely possible that oxygen can be counted on as a means of raising steel capacity, but, in the meantime, a number of operating problems must be solved such as extending life of furnace front and back walls and roofs. Work done so far, indicates that oxygen may have beneficial effects in increasing the output of pig iron from blast furnaces.

New Consumption "Gage" — "For those who may substantially disagree with the results as shown here or who may wish to investigate capacity requirements on other bases, a chart (Fig. 8) is included so that estimates may be made without reference to the mathematics involved. Start with any per capita use from 900 to 1200 pounds and draw a line horizontally to the intersection of the line showing any population total from 140 to 190 million people. Then, draw a vertical line from the intersection to the upper scale which will show the ingot capacity required at 75 per cent average plant operation."

Conclusions. . The record shows that in peacetime the steel industry never has operated at anything like full capacity with the exception of the period after World War II. In contrast to the first world war, the recent war was almost completely "mechanized" which meant that every available pound of steel, as well as the nonferrous metals, was needed. This left an accumulated civilian consumer demand which required satisfaction when the war ended. There now is growing evidence that consumer "pipelines" are virtually filled. Therefore, unless it can be proved that the United States has suddenly arrived at a much higher "economic plateau," the present expansion program of the steel industry appears to be in step with "full employment" requirements and, at the same time, providing for emergencies.

Productivity Study

Develops no evidence to show gain in overall manufacturing during past two years

NATIONAL Industrial Conference Board reports little evidence has been developed to show productivity for manufacturing as a whole has increased during the past two years. In some segments of manufacturing, productivity has advanced considerably since 1946, but for all manufacturing combined, the impact of the postwar surge in hourly wage rates or unit labor cost has not been offset or even significantly retarded by gains in output per man-hour.

Since 1939 overall gain in production per hour of labor input has averaged less than 1 per cent a year, while the accompanying increase in labor cost per unit of production has averaged about 11 per cent yearly. In the closing months of 1948, unit labor costs for all manufacturing were about 100 per cent higher than before the war, fully a fifth above 1946, and 10 per cent higher than in 1947.

The board states output per man-hour in January-September, 1948, was but fractionally higher than in 1946 or 1947, and about 6.7 per cent above 1939.

New Tools — Manufacturers, according to the analysis, have been adding larger amounts of tools, plant and other facilities since the return to civilian production. More than $8 billion was spent on factories and new equipment during 1948. Gross expenditures in 1945-1947 totaled $16.6 billion. The comparable amount in 1939 was $1.9 billion.

The index of output per man-hour for all manufacturing was 106.6 (1939=100) in the third quarter, 1948, as compared with 112.0 and 107.2 in the same three months of 1945 and 1946, respectively. During the spring of 1948, the index advanced to 108.2 (about the level of 1941). But in the following and most current three months for which data are available, the analysis continues, it declined again. "In contrast, unit labor costs have continued upward in virtually every quarterly period since mid-1945. Consequently, labor cost per unit of product was 38 per cent higher in July-September, 1948, than it was three years earlier."

Analysis by Industry—In four industries (flour, glass products, leather and cement), the analysis finds output per man-hour increased in 1947 and declined in January-June, 1948. A decrease in productivity during 1947,noted in footwear, canning and preserving, and condensed and evaporated milk, was followed by gains of 5, 9, and 17 per cent, respectively, in the first half, 1948. The downward movement noted in 1947 in confectionery, malt liquors, and clay construction products continued in the first six months of 1948

"The net effect of the 1947 and 1948 changes was that output per man-hour in mid-1948 was higher than in 1939 in six industries and lower in the remaining five." Gains were: Confectionery (5 per cent), cement (7 per cent), footwear (11 per cent), leather (17), canning and preserving (20), and tobacco (21). Declines were: Clay construction products (1), condensed and evaporated milk (4), glass products (5), flour (16), and malt liquors (17).

Increases in average hourly earnings of wage earners in these industries of 10 per cent or more in 1947 were followed during the first half of 1948 by increases ranging from 3 to 10 per cent.

Data for the 22 industries included in the analysis indicate a "wide diversity" in productivity trends from 1946 to 1947. Production per man-hour advanced in 13 of the industries and declined in nine during the year. Gains of 4 per cent or more occurred in seven industries (rayon, beet sugar, coke products, flour, cane-sugar refining, soap and glycerine and glass products), while decreases of 4 per cent or more in the output-labor input relationship were found in six industries (selected machine tools, bread, condensed and evaporated milk, confectionery, footwear, and ice cream).

FLOATING FACTORY: Valued highly as an industrial lubricant, 9300 tons of sperm oil worth $3,720,000 were delivered to the Bayway, N. J., docks of the Werner G. Smith Co., Division of Archer-Daniels-Midland Co., by the British ship *Anglo Norse* manned by Norwegians. The mother ship of a flotilla of seven whale-killer boats, the *Anglo Norse* takes sperm whales up a special ramp in the stern and extracts the sperm oil. The oil thins out very slowly under heat, thus making it a highly valuable ingredient in extreme pressure and high-speed lubricants. There also are many other industrial uses of sperm oil

Anker-Holth Names Sales Agents

ANKER — HOLTH Mfg. Co., Port Huron, Mich., has appointed Hanscome-Rogness Inc., Minneapolis, as distributor of its line of pneumatic and hydraulic operated holding devices in Minnesota and northwestern Wisconsin. H. E. Stone Engineering Co. Inc., Oaklyn, N. J., will serve in a similar capacity in Maryland, Delaware, eastern Pennsylvania and southern New Jersey.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Controversial features of Truman legislative program may be temporarily abandoned as price of getting action on vital measures. Legislative battle later seen

SIGNS are mounting that administration advisers are so seriously concerned over prospects of getting vital parts of the Truman legislative program through Congress in the remainder of the session, they possibly may abandon controversial features for the time being. These tactics may postpone a legislative battle until later.

Want To Get Going—Meanwhile it is evident that the President's congressional leaders want to get going on such major tasks as overthrowing the Taft-Hartley act, and getting new wage and other labor bills before House and Senate. If they can arrange for postponement of present deadlocked issues, they figure their chances of a successful vote on the labor bill, and possibly the President's control programs, may be improved.

First reaction to the latest Lewis coal strike has been that it will aid tremendously in keeping the Taft-Hartley law. Administration forces, already facing an uphill struggle to obtain a revision, are reported greatly concerned over public reaction to the Lewis strike.

Still In Committee—These labor bills are still in committee on the House side. The House Labor Committee is reportedly sure of only a 1-vote margin in favor of the administration substitute for the T-H act.

Hearings on the bills, to repeal the law, and restore the Wagner act, are only about half-completed, before a 13-man subcommittee of the House Labor Committee. While the subcommittee is expected to report an administration-sponsored bill virtually unchanged, by 8 to 5, the full committee is said to expect a 13-12 vote to report it out. That was the count in the full committee on the pending 75-cents an hour minimum wage bill, which is tied-in with the larger bill.

A move is reported under consideration on the Democratic side of the full committee to permit some modifications of the bill to repeal the T-H law, if this concession will give them a better vote margin.

Munitions Board Reorganized

REORGANIZATION of the Munitions Board to focus broader powers under civilian control has been completed by Chairman Donald F. Carpenter.

Under the set-up, civilians will head the board activities dealing with industrial matters, although military aides will be assigned. Only strictly military programs will be headed directly by military men, however.

The director for industrial programs will be a civilian, and while this official is being selected, the division will be headed temporarily by Maj. Gen. Sydney P. Spalding. General Spalding will become military adviser to the civilian director later.

Production Planning—This office will be concerned primarily with such matters as production planning, purchase procedure, stockpiling, construction and manpower.

Industrial Mobilization, another division, will be headed by Harry E. Blythe, president, Buffalo Weaving & Belting Co., Buffalo, and Galanet Products Co., Alliance, O.

Another civilian division, Facilities & Services, will be headed by a deputy chairman, J. Clawson Roop, former Pan American Airways official.

Wallgren Nomination Rejected

SENATE Armed Services Committee last week rejected President Truman's nomination of Mon C. Wallgren of Washington to head the National Security Resources Board by a 7 to 6 vote. Only way in which the nomination now could reach the Senate floor is through a motion to discharge the committee, which is considered unlikely. Committee said that "a majority of the committee feels that a man of wider economic and industrial experience and competency" should be selected as NSRB chairman.

Vinson-Trammell Act To Stand

THERE is little likelihood the Vinson-Trammell act will be repealed this year, according to Navy sources, who are therefore notifying all bureaus dealing with contracts to keep in mind its provisions.

The act requires that with respect to Navy contracts subject to this law, contractors or subcontractors must file specified reports to the Navy Department upon completion of the work, as a requisite to receiving final payments.

In general, the act establishes certain profit limitations on Navy work. Navy bureaus must determine whether or not work comes under the scope of this law.

National Income Change Slight

COMMERCE Department reports national annual income was at an annual rate of $220.8 billion in January. Personal income in the month was virtually unchanged from the December, 1948, record of $221 billion. Wage and salary payments declined in the month due to employment reductions. The decline, however, was offset by a sharp rise in farm income which was due to a rise in crop prices and in volume of crops marketed or put under government loan. Private payrolls in January were about 1.5 per cent below the level of the fourth quarter of last year, but nearly 6 per cent above January, 1948.

Market Survey Report Issued

PRESENT and potential markets for consumer and industrial goods in continental United States, Alaska and Hawaii are pinpointed in a series of 51 statistical reports just released by the Department of Commerce.

The reports contain aggregate employment and pay-roll data for 2,512,280 reporting units employing 34,494,168 workers in March, 1947, and having taxable pay rolls totaling $20,607,734,000 for the period January-March, 1947. The firms are grouped by state and county under 157 industry classifications for 415 counties and under 9 major classifications for all counties.

The series, entitled "Business Establishments, Employment and Taxable Pay Rolls," consists of one summary report for the United States (including Hawaii and Alaska), one for each of the 48 states and the District of Columbia, and one for Hawaii and Alaska.

The data were compiled by the Bureau of Old-Age and Survivors Insurance of the Social Security Administration, Federal Security Agency, and prepared for publication by the Office of Domestic Commerce, Department of Commerce.

The first series of similar data, covering January-March, 1946, was released in 1947. The present series has been improved principally by

Storm Sash on Mass Production with AMERICAN MONORAIL

"Hang-on" station with upper level track over the cleaning and painting operations shown in background.

• A well-known manufacturer of steel office furniture has successfully undertaken mass production of screen and storm sash. A continuously operated finishing department, with a capacity of 80 storm sash and component parts per hour, is made possible by a 300 foot manually operated American MonoRail Overhead Handling System. Of a staff of 60 personnel, only 5 are required in the finishing department. The American MonoRail system transports all the pieces from cleaning and priming tanks to paint dipping vats to ovens to storage. Manual operation was chosen because of the diversity in size and shape of the pieces being finished.

Trolleys travel to dipping station where air-powered drop section lowers carriers to floor-level paint tank.

From the simplest hand-operated unit to the most complicated fully automatic system. American MonoRail engineers can suggest a system best suited to **YOUR** problems.

Finished sash travel through oven on monorail tracks which extend through rear door to stock bank.

SEND FOR BULLETIN C-1, a 56-page book showing successful applications of American MonoRail Systems.

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PRESIDENT'S HELPERS: Conferring with John R. Steelman, right, assistant to President Truman, is David H. Stowe, newly appointed administrative assistant to the President. Until his new appointment, Mr. Stowe, who is a native of New Canaan, Conn., was deputy to Mr. Steelman and previously served in the Budget Bureau from 1941 to 1947. NEA photo

more detailed break-down of industries and size of establishments, the Office of Domestic Commerce said.

Data are included for 255,154 manufacturing establishments, 862,876 retailing units, 235,477 wholesale units, and over 500,000 service units.

World Trade At High Level

WORLD trade in 1948 probably exceeded $51 billion, according to the Office of International Trade. While the 1948 estimate is about 6 per cent greater than the 1947 total of $48 billion, prices in 1948 were approximately 10 per cent higher than in 1947.

With values expressed in terms of "constant dollars," eliminating the price factor, the volume of global trade last year was actually a little less than the 1947 volume, perhaps by 3 to 4 per cent.

Dominant factor in the 1947 world volume was the tremendous expansion in United States exports as result of the abnormal postwar demand of the rest of the world. Exports from many countries continued to rise throughout the year, but the increase in volume was not sufficient in 1948 to counterbalance the decrease in exports from the United States.

U.S. exports in 1948 amounted to $12.6 billion, a decline from the previous year of about 18 per cent in value and 23 per cent in volume. However, they were still more than twice the volume of prewar exports, and constituted about one-fourth of the world total for the year.

Larger Board More Effective

NATIONAL Labor Relations Board has increased its output of decisions more than 50 per cent since enlargement from three to five members. During 16 months' operation with five members, the board handed down 3128 decisions in all types of cases, an increase of 53 per cent over the 2040 decisions issued by the three-member board during the last 20 months under the Wagner act.

In the 16-month period, the five-man board issued 300 decisions in unfair labor practices despite the fact many cases were held up during the early days of the Taft-Hartley act pending filing of non-Communist affidavits by the unions involved. This compared with 206 decisions issued by the three-man board during preceding 20 months.

In collective bargaining cases, the five-man board made 2045 decisions compared with 1834 by the smaller board. In addition, the larger board issued 783 decisions on petitions for union-shop authorization polls, while there were no decisions of this type by the smaller board.

Part of the increase is attributed to establishment of a rotating panel system. Under this, five panels each consisting of three board members were set up. Each panel meets once a week, while the full five-member board meets at least twice a week to pass on cases involving important or novel questions of policy.

During the past nine months the board has slashed its backlog of pending cases by more than 58 per cent. At the end of December it had 6110 cases pending before it, as against a peak backlog of 14,421 cases at the end of April, 1948.

Atomic Energy Job Openings

NEW types of job opportunities are opening up through application of atomic energy to peacetime uses by the Atomic Energy Commission. Since the AEC depends on industry to operate its huge multi-billion dollar plants and more than 1200 privately-owned plants, laboratories, and other facilities, most of the new job openings are in private industry.

At present there are about 70,000 employees working on atomic energy projects. Only 5000 of these are on the government payroll and but 600 are stationed in Washington.

Applications of the use of radioisotopes are being effected in many industrial fields largely on an experimental and testing basis in metals, oil, rubber, and other manufacturing processes.

In many of these fields the shortage of trained and experienced personnel to care for increased applications is acute. Senior positions for scientists with several years' experience are open. A serious shortage exists in persons trained in physics and medicine. Similarly, there is a lack of engineers with knowledge of nuclear physics or process chemistry.

Other personnel needed include: Welders; gas diesel mechanics; ceramic engineers; metallurgists; power plant engineers; scientific report writers; draftsmen in aircraft engine components, controls, accessories, and test equipment.

The AEC uses its Washington personnel office as a clearing house and agent for recruiting and placing personnel in both federal jobs and private employment with contractors working for the commission.

Iron and Steel Price Rise Lags

PRICES of iron and steel have risen only two-thirds as much as the average of all commodities since 1939, according to American Iron & Steel Institute. Comparison is based on wholesale price indexes published by Bureau of Labor Statistics.

Toward the end of 1948, iron and steel prices, up 72 per cent since 1939, were far behind the average commodity level, which was up 114 per cent.

Engineering Enrollment

In colleges rapidly adjusting back to prewar trends. Absorption problem year distant

ENROLLMENT in engineering colleges indicates rapid readjustment back to prewar trends, according to S. C. Hollister, Dean of Engineering, Cornell University, in an article in the *Journal of Engineering Education.* Figures collected by the American Society for Engineering Education show freshman enrollment this year of 48,000 in engineering, down sharply from 80,000 in 1946. The present freshman class is slightly greater than the trend of freshmen registration in pre-war years.

By 1952-53 it is anticipated the number of engineering graduates will reach the normal trend extended from prewar years.

Although enrollments in upper classes are abnormally large due to a large veteran enrollment, Dean Hollister says these are, in considerable part, replacements for the large wartime deficits. This deficit has been borne out by the acute shortage of engineers in the postwar era. The problem of absorption of engineers in industry, if there be one, will develop next year or the year after. Beyond 1951-52, the number of engineering graduates each year will return to prewar trends or perhaps fall slightly below these trends due to the decline in birth rate during the depression years of the 1930s.

With stable economic conditions, Dean Hollister says, prospects for freshmen entering in 1949 should be good. A number of factors, such as the ones of far-reaching scientific and technical advances of the past few years, the use of engineering graduates outside the proximity of professional resources—all of these and many others may cause a sharp upward trend in engineering employment. It also is conceivable a rapid development of a national emergency might actually find the nation with a short supply of engineers.

In recent months statements have appeared that rate of trained engineers is beyond demand and that prospects for many young engineers of finding suitable employment in the profession will be poor. Reliable information, however, does not bear out these statements.

Sees Merit in Conveyor Plan

COMMENTING on the proposed conveyor belt from Lake Erie to the Ohio river, C. M. White, president, Republic Steel Corp., Cleveland, stated it appears a sound engineering plan and should be given a great deal of consideration and study.

He pointed out that the steel industry of northeastern Ohio needs either a canal or a conveyor system to compete with steel producers more favorably situated due to improvements undertaken by the government on the Allegheny, Monongahela and Ohio rivers.

"Either the canal or the conveyor will hurt some railroads temporarily," Mr. White said, "but it has been the experience of this country that each new advancement in science or industry ultimately reacts to the overall good." Although the plan has been opposed by Mayor Thomas Burke of Cleveland, Mr. White said he found it hard to believe that this proposal would act to that city's detriment.

First Full Year for Lone Star

LONE Star Steel Co., Dallas, which on Dec. 31, 1948, completed its first full year of operations with a net income of more than $3.2 million on net sales exceeding $16.4 million, is preparing for an expected buyers' market by cutting its prices, developing new markets, reducing production costs and striving for increased output.

Last month Lone Star reduced the base price for No. 2 foundry iron from $75 to $50.50, although the company's average net sales price for pig iron during 1948 was $58.81. As of Mar. 1, 1949, the producer established its own sales department and terminated a sales contract with E. L. Brumley Sales Co.

To reduce production costs, Lone Star initiated several improvement projects during the year, one of which was the replacement of its furnace hearth lining with carbon block. The company also purchased an additional calcining kiln from War Assets Administration. Its $3.2 million profit for the year will be plowed back into the business. Lone Star has applied for a $70 million loan from Reconstruction Finance Corp. for construction of steelmaking facilities.

Electrification Forum Set

MACHINE Tool Electrification Forum, sponsored annually by Westinghouse Electric Corp., will be held Apr. 26 and 27 at Buffalo. First day's session will be at the Hotel Statler and the second day's meeting at company's Buffalo plant and will include an inspection of the plant.

Papers will be presented by L. A. Liefer, Gisholt Machine Co., Madison, Wis., on an "Automatic Piston Ring Machine"; LeRoy Morrill, Heald Machine Co., Worcester, Mass., on "High-Frequency Systems for Machine Tools"; George Levesque, Brown & Sharpe Mfg. Co., Providence, R. I., on "Bonded Resistance Wire Strain Gages as Components of Machinery and Gage Equipment"; D. G. Hatchard, Westinghouse, on "R-F Heating of V-Ways"; D. E. Herr, Westinghouse, on "Machine Tool Control Transformer"; L. W. Herchenroeder, Westinghouse, on "Electrical Braking for Induction Motors"; J. E. Priest, Westinghouse, on "Adjustable Speed Saturable Reactor Drive."

One session will feature a panel discussion led by D. W. McGill of Westinghouse, assisted by R. H. Clark, Warner & Swasey Co., Cleveland; E. J. Rivoira, Cincinnati Milling Machine Co., Cincinnati; and John Doran, G. A. Gray Co., Cincinnati.

Calendar of Meetings

Mar. 21-24, Forced Warm Air Conference: Eighteenth annual gathering, on Michigan State College campus, East Lansing, Mich.

Mar. 22-23, Export Managers Club of New York Inc.: Meeting, Hotel Statler, New York. Club headquarters are at 2 Lafayette St., New York.

Mar. 24-26, Electrical Maintenance Engineers Association of Southern California: Third annual industrial electrical show, Shrine Convention Hall, Los Angeles.

Mar. 28-Apr. 1, American Chemical Society: 115th national meeting, on sour crude oil, San Francisco.

Mar. 30-Apr. 1, American Iron & Steel Institute: Meeting of chairmen and presidents of company members, The Greenbrier, White Sulphur Springs, W. Va.

Mar. 30-Apr. 1, Institute of Metals: Annual general meeting at Institution of Mechanical Engineers, London.

Apr. 4-6, National Sanitary Supply Association: First institute of sanitation and modern cleaning methods, Hotel Sherman, Chicago. Press headquarters for the association are at 220 S. State St., Chicago.

Apr. 5-6, Metal Powder Association: Fifth annual meeting and exhibit, Drake Hotel, Chicago. Association headquarters are at 420 Lexington Ave., New York.

Apr. 6, Detroit Chapter of American Foundrymen's Society: Congress of foundry experience, Rackham Memorial Bldg., Detroit.

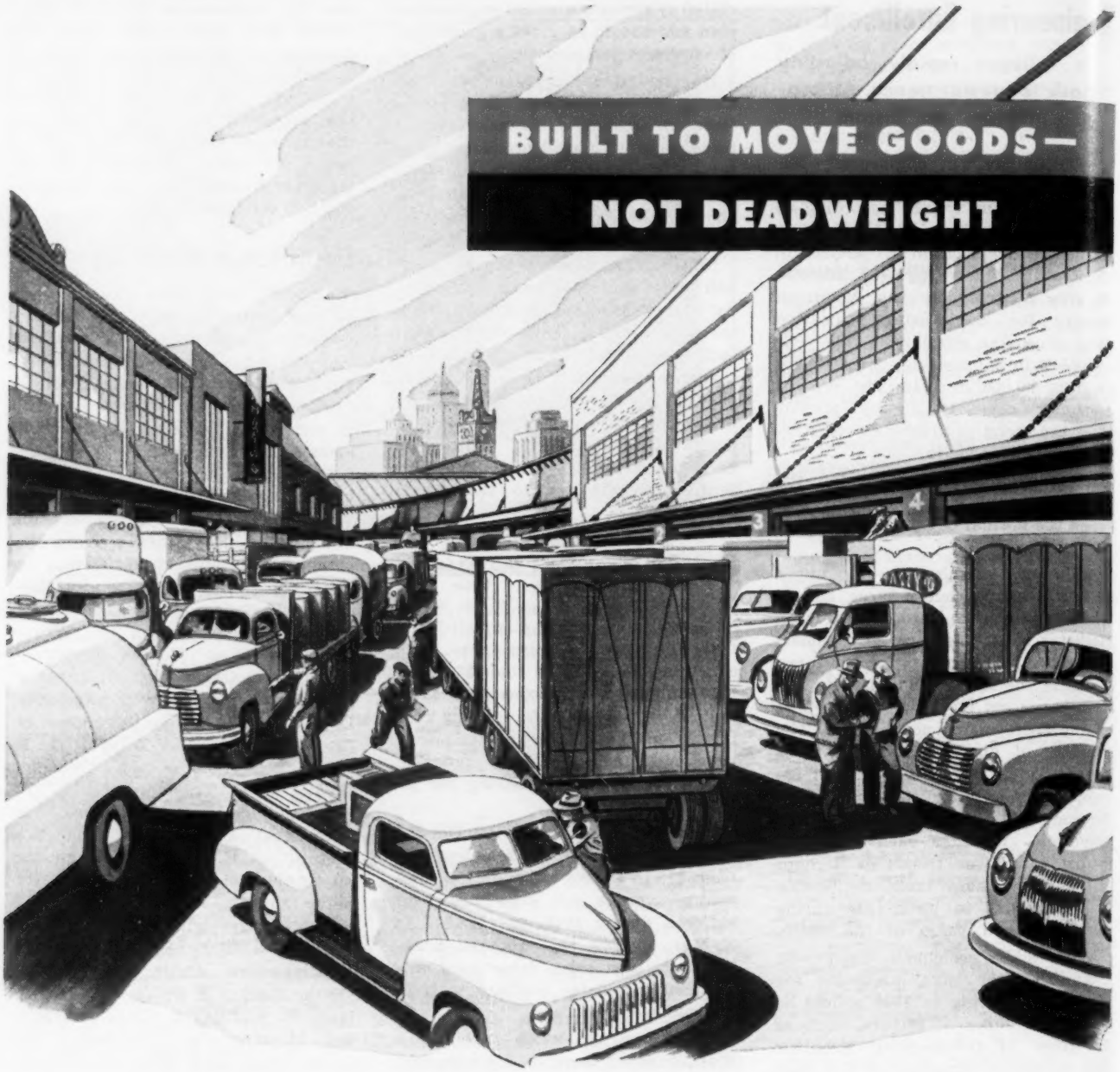
Apr. 11-12, American Zinc Institute: 31st annual meeting, Hotel Statler, St. Louis. Institute's Galvanizers Committee will meet concurrently with the general convention. Institute headquarters are at 60 E. 42nd St., New York.

Apr. 11-12, American Institute of Electrical Engineers: Conference on industrial application of electron tubes, Hotel Statler, Buffalo. Institute headquarters are at 33 W. 39th St., New York.

Apr. 11-12, American Machine Tool Distributors Association: Meeting, Hotel Oglethorpe, Savannah, Ga.

Apr. 11-13, American Society of Lubrication Engineers: Annual convention, Hotel Statler, New York. Lubrication show will run concurrently with the convention.

Apr. 19-20, Magnesium Association: Annual spring meeting and product exhibit, Edgewater Beach Hotel, Chicago.



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By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Argument over frameless vs. frame-and-body types of construction flames anew. Case for latter presented at SAE meeting. Only two auto builders now using unitized system

DETROIT

FRESH fuel was thrown on the fires of argument over frameless versus frame-and-body types of construction for automobiles at the recent Society of Automotive Engineers meeting here. Nash and Hudson are the only manufacturers now making use of the unitized or frameless system, Lincoln having dropped it for 1949 models. Chevrolet presumably was going ahead on this type of design for its projected light car which was halted before it reached the production stage. Over the years the subject has blown hot and cold, at present being a little on the chilly side.

The case for frame-and-body construction was made by D. W. Sherman, chief engineer for A. O. Smith Corp., Milwaukee, who might be expected to show some partiality in view of his company's important position as a frame supplier. He declared flatly at the outset that there is not sufficient difference in weight and cost between the two types of construction to permit accurate evaluation unless it is done by comparing two cars which are the same in every respect except for frame and body structure. His staff set about to do this and has progressed to the point where rigidity checks have been completed on a car originally having unitized construction, rebuilt to take a separate frame. Weight with the separate frame increased by 30.2 pounds over the original, and overall rigidity was somewhat less, pointing to the need of additional stiffening of the frame at the body mounting points. Cost differentials have not yet been determined.

Design Restricted—The car with the separate frame can be improved over today's standards, in the opinion of Mr. Sherman, but certain design details must be respected, both as to body and frame. Restrictions placed upon the depth of the frame are to its disadvantage, although gains from better body-to-frame connections will permit some reduction for equal performance. However, clearance restrictions can be carried to the point where there is no space for the frame rails as now known, so regardless of wishes design is restricted by physical factors such as minimum ground clearance.

Design of a frameless car involves not only structural design ability, but a very specialized form which can be realized only through considerable time spent in the study and analysis of laboratory research results. Furthermore, it does not lessen the need for production engineering but rather intensifies such need. Mr. Sherman suggested there are not many persons qualified to lead a project involving a unitized design, and hence the lead engineer will need to delve into detail to a degree not normally associated with the direction of a design project.

The requirement for assorted body types further complicates the unitized design, and so Mr. Sherman noted, in the case of a convertible, there is no way known to develop a rigid design which will stand up, without the incorporation of a heavy X-member suitably tied into the structure.

Repair Costs—Another point frequently brought up in consideration of the frameless car is the cost of repairs. Criticism on this score perhaps has been overdrawn. Theodore Ulrich, chief body engineer for Nash, reviewing the design of frameless car bodies and its relation to service, said that a survey made within the past 30 days by insurance company adjusters showed the cost of repairs on Nash cars was comparable to those on other makes, and in some cases was less because no frame straightening was required.

As he saw it, the repair problem on the unitized body is simply one of straightening out buckled panels and box sections, gas or arc weld service panels into place, solder-up and finish, or essentially the same as with the frame-and-body combination.

Objections to the unit-type construction in respect to corrosion have been overcome by the use of weld primers on body side sills which form the main box sections of the underbody, complete bonderite treatment of the body-in-white, various types of welding sealer on vital spot welded joints and a final seal in semi-liquid form applied with guns to all welded joints. These sealers are important not only from the standpoint of preventing corrosion but also for eliminating the infiltration of dust and fumes to interiors.

Tests Described—Tests on a ⅛-scale body model of unitized construction were described by A. R. Lindsay, executive engineer of the Budd Co., Philadelphia, who concluded this type of design offered significant advantages. Among them he noted savings in heavy-gage steel, reduction in weight, savings in plant equipment and floor space and less labor from the elimination of body shimming, rehanging and fitting of doors, and front-end sheet metal after mounting body on the chassis. Difficulties caused by misalignment between parts which are attached to both body and chassis or function through both units also are minimized in his opinion.

In the final analysis, the choice between the two types of construction is simply one of cost—materials, labor and manufacturing layout. With

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

	1949	1948
January	445,100	422,236
February	449,729*	399,471
March		519,154
April		462,323
May		359,996
June		454,401
July		489,736
August		478,186
September		437,181
October		516,814
November		495,488
December		514,337
12 mos.		5,549,323

* Preliminary.

Estimate for week ended:

	1949	(Same week) 1948
Feb. 26	118,815	120,130
Mar. 5	118,267	108,343
Mar. 12	113,903	114,689
Mar. 19	122,000	115,556

Ward's Automotive Reports

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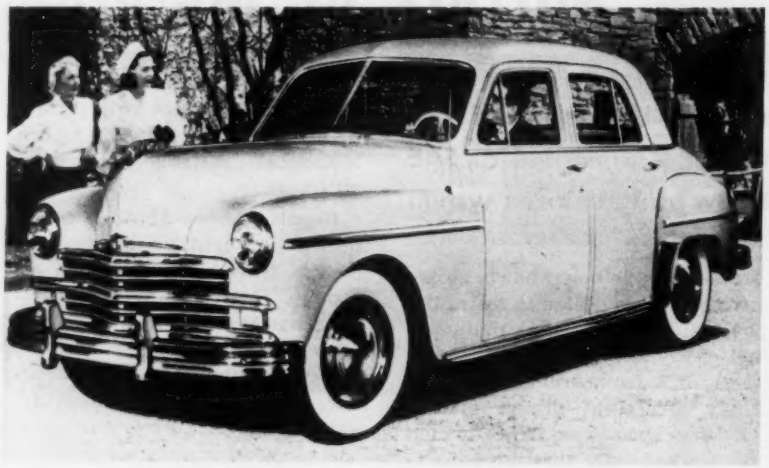


NEW PLYMOUTH: The 1949 Plymouth features streamlined bodies that are lower and narrower on the outside, yet providing wider seats and greater headroom on the inside. Although overall exterior dimensions are reduced, wheelbase has been lengthened to 118 in. and glass area increased. Horsepower has been raised to 97. While fenders flow into the body they are detachable for ease in repair. Pictured is the special deluxe four-door sedan. NEA photo

conventional chassis frames now all moving in the direction of automatically welded designs—Ford and Chrysler now have standarized on them—it would not appear too much of a step to expect to see frames ultimately incorporated into the body structure itself. The transition appears logical costwise and in the light of the current trend to "automation," or whatever you prefer to call it; that is, the mechanical integration and conveyorization of manufacturing and assembly.

Development of New Cadillac

SCHOLARLY account of the development work incident to the birth of the new Cadillac V-8 high-compression engine was unfolded for SAE by E. N. Cole, chief engineer, and H. F. Barr, staff engineer of Cadillac. This engine, incidentally, with 7.5:1 compression ratio and 331 cubic inch displacement, narrowly missed approval for production as a design with 8:1 ratio and 309 cu in. displacement.

Final decision was dictated by the availability of gasoline of sufficiently high octane rating throughout the country. Fuel of 88-octane has been readily obtainable on the East and West Coasts but it has been a little slow to come onto the market in the Middle West, probably because oil companies in that area did not have the catalytic cracking equipment necessary to process the fuel. Now, however, it is understood 88-octane gas can be purchased almost anywhere, and competition between oil companies is sharpening to the point where octane ratings of 90 and up may be marketed at an earlier date than had been thought originally. If so, it should prove a potent spur to activate new engine programs by other manufacturers in the high-compression field. Such an eventuality could mean much for suppliers of machinery, tools and equipment.

Battle of Materials—The battle of materials was carried out on a number of fronts in the Cadillac engine development. Extended tests, for example, were conducted on tappet and camshaft life, using both cast iron and steel tappets in combination with an alloy iron shaft. The tappet specification included a 30-inch spherical radius on a chilled face of minimum 55 Rockwell C hardness, 10 to 15 microinch honed finish, with a ferro antiscuff treatment. The camshaft nose radius was 0.235-inch with a 7-minute taper to produce tappet rotation, cams were polished and a hardness of 70 Scleroscope maintained on the nose. Pitting failures developed in cast iron tappets after 25,000 miles of operation in a test engine.

Tests on SAE 5120 steel tappets did not show pitting failures but developed excessive score and wear during break-in. Thus the problem was to develop a treatment for the steel tappet face which would combine the run-in characteristics of iron and the high fatigue strength of steel. Scoring of the steel proved to be not only a question of lubrication but also of distributing the load during run-in, which would reduce actual unit pressure to a reasonable working value. Rough grinding (30 to 40 microinch) and honing were tested, along with shot peening. The objective was obtained by controlled grit blasting on the face after finish honing. Tappets are carburized and hardened to 60-63 Rockwell C, the face honed to 65-inch spherical radius and grit blasted to retain oil. Finally, a lubrite treatment is used for better break-in.

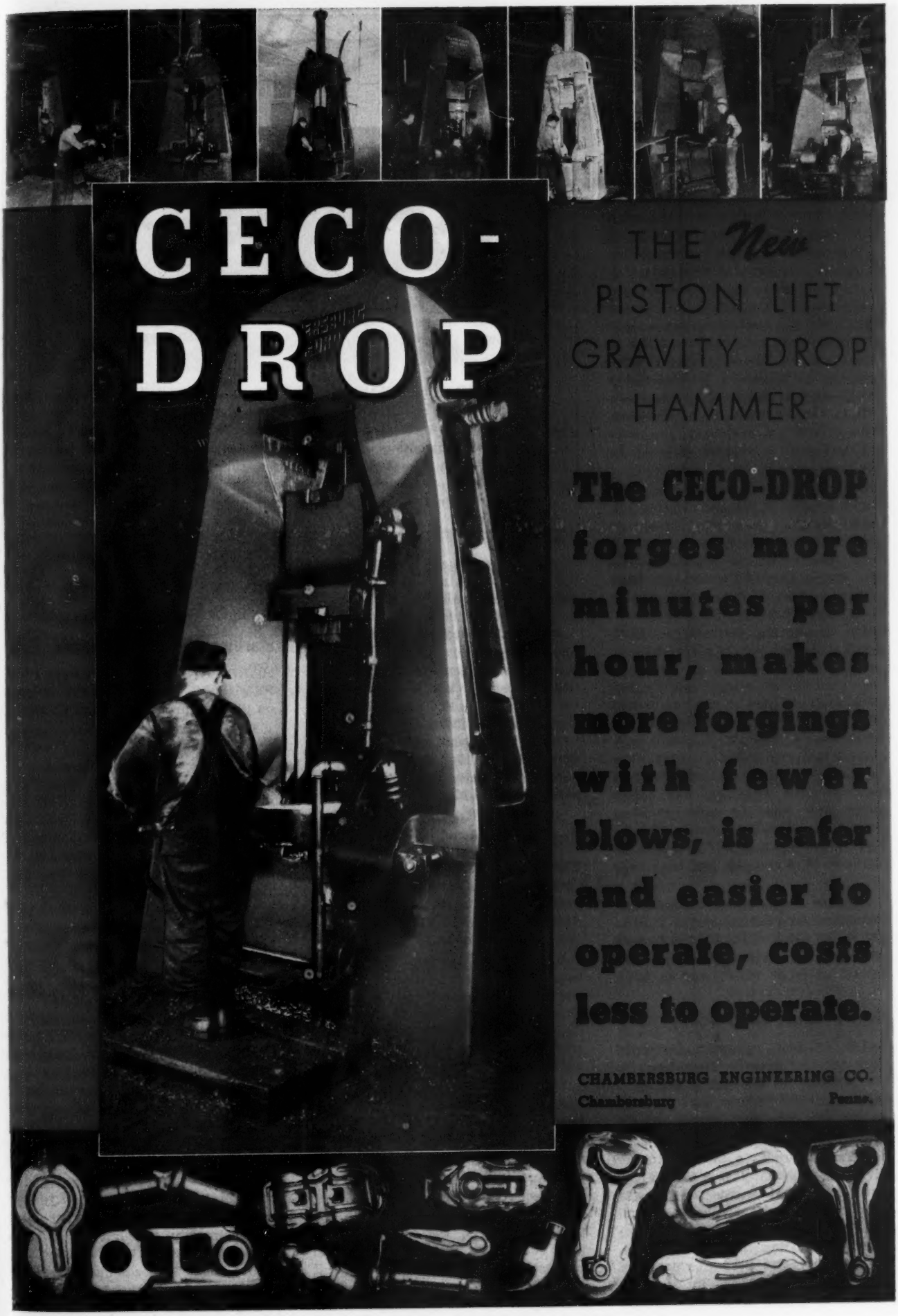
General Motors "Case History"

ANNUAL financial report of General Motors, always one of the most interesting "case histories" of big business to be released, shows a record peacetime physical volume of production in 1948, net sales aggregating over $4.7 billion, yielding net income of $440,447,724, equivalent to $9.72 per share on common stock and 9.4 per cent on sales. Total taxes paid exceeded net income by $23 million. Breakdown of the GM sales dollar is as follows:

To suppliers for materials, supplies, services, etc.	$.502
To employees for payrolls, salaries, etc.	.285
To federal, state and local governments for taxes	.098
To provide for depreciation and obsolescence of plants and equipment	.021
To 434,000 stockholders	.045
Retained for use in the business	.049
	$1.000

Before the war, GM traditionally provided for capital needs by reinvesting in the business a modest portion of its income. During the 1930s an average of 9 per cent of net income proved sufficient, and even in the 1920s when the volume of business was expanding rapidly and expenditures for plant were heavy, only 36 per cent was retained. However, during the past three years, earnings reinvested in the business averaged better than $117 million per year, or 43 per cent of net income. To this was added $223 million realized from sale of preferred stock, $351 million in long-term notes, and about $174 million accumulated from amounts provided principally for reserves, for employee benefit plans, payments to be made in later years, and from sale of minority holdings in other companies. These three items totaled nearly three-quarters of a billion dollars required for increased capital needs.

Increases in inventory accounts at the end of 1948 were nearly $100 million over 1947, totaling better than $786 million. The boost for the most part reflected higher prices.


CECO-
DROP
THE New
PISTON LIFT
GRAVITY DROP
HAMMER
The CECO-DROP forges more minutes per hour, makes more forgings with fewer blows, is safer and easier to operate, costs less to operate.
CHAMBERSBURG ENGINEERING CO.
Chambersburg
Penna.

Carborundum Transition

Firm decentralizing into four major divisions formed around groups of like products

CARBORUNDUM Co. will complete by the middle of this year a transition program which involves decentralizing its organization into four major divisions formed around groups of like products.

With the exception of executive direction, research and finance, which are centralized in the company's general administration office in Niagara Falls, N. Y., Carborundum is now organized into Bonded Products & Grain, Coated Products, Refractories and Globar Divisions. Responsibility for production and sales of like products is concentrated in the divisions, with production, technical, engineering and sales personnel directed by the respective division managers.

Bonded Products & Grain Division's major expansion program during the year was the construction of a new plant at Vancouver, Wash., which will begin production of silicon carbide this spring. Coated Products Division is now located in Wheatfield, N. Y., at a plant where full production will begin this spring. Refractories Division has modernized its plant at Perth Amboy, N. J. Capacity for crushing and grading of silicon carbide has been doubled. Last month production of Monofrax refractories began at the division's Falconer, N. Y., plant purchased and remodeled in 1948. Globar Division, which produces heating elements and resistors, has introduced new lines to meet growing television and radio demands. The division's net sales in 1948 showed an increase of about 15 per cent over 1947.

Because of this transition program, Carborundum's net income of $1,016,922 on net sales of $43,450,788 in 1948 fell below the net income of $1,878,629 on net sales of $42,471,399 in 1947.

New Product Sales Boom

SALE of new products developed since the war exceeds the entire old-line business of the companies making up Hewitt-Robins Inc., Thomas Robins Jr., president, reveals in his annual report for 1948.

The new products in the Rubber Division, principally Restfoam, now more than equal in sales the prewar business of Hewitt Rubber Co., and sales of new types of vibrating machinery, including the Car Shakeout, exceed the entire prewar volume of Robins Conveyors Inc. In addition, Hewitt-Robins is developing several other new products, one of which, the Rubberlokt wire wheel brush with molded rubber center, is already in limited production.

Financial showing of the company for the year fell below expectations because of a ten weeks' strike at the foam rubber and mechanical rubber goods plants at Buffalo. Net sales for the year ended Dec. 31, 1948, totaled $19,623,002, compared with $21,609,351 in 1947. Net earnings for last year amounted to $737,767, compared with $1,223,618 in 1947.

SCHOOLING SALESMEN: To equip its salesmen, Kellogg Division of American Brake Shoe Co. gives them a ten weeks' course at its Rochester, N. Y., headquarters. Trainees make a tour of the Rochester plant, dismantle and reassemble the division's products, study application of the products, learn company policies, then supplement their studies with in-plant work, followed by traveling with an experienced salesman. After trainee proves his ability by performance, he is assigned a territory

Republic Operating New Ovens

REPUBLIC Steel Corp. will put into operation the first of two new 40-oven coke batteries at Warren, O., Apr. 1. Work will start on the second battery at once.

Republic is tearing out 64 old ovens. It had 61 others built in 1942. When finished, the plant will have a daily capacity of about 2500 tons of coke and will furnish about 1000 tons to Youngstown blast furnaces.

The coke program in Youngstown and Warren is costing about $15 million and is part of a long-range expansion in the area whose total cost may reach nearly $50 million. The program has included installing silicon steel rolling facilities at Warren, boosting capacity of the Niles, O., plant, electrifying the bessemer plant in Youngstown, converting an old plate mill into a 48-in. hot strip unit and installing top pressure blowing techniques in blast furnaces. The Warren furnace produced a record average of 1468 tons daily in February.

Harbison-Walker Expands

HARBISON-Walker Refractories Co., Pittsburgh, spent $5,712,257 in 1948 on plant improvements and additions.

Major projects included: Completion of new Baltimore and Fulton, Mo., works; increased capacities at Clearfield, Pa., Athens, Tex., and Portsmouth, O.; opening of a new quarry at Mt. Union, Pa., for production of silica refractories; installation of more efficient facilities at the East Chicago, Ind., Hays, Pa., and Templeton, Pa., works.

Company's net income for 1948 was $5,805,971, compared with $5,161,498 in 1947.

Westinghouse Output Hits High

INCREASED capacity, technical advances and stable management-labor relationships enabled Westinghouse Electric Corp. to manufacture and ship $970,673,847 worth of electrical products during 1948, an all-time record. In dollar volume the 1948 output was $149,420,098 greater than 1947.

New orders received during the year totaled $1,032,466,216. Unfilled orders for products other than those sold primarily through distributors totaled $648,862,423 as of Dec. 31, 1948. About 35 per cent of Westinghouse sales are for products sold primarily through distributors.

Briefs . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Ludgate, Lear & MacGregor Inc. has been formed in Pittsburgh as a steel mill engineering service and to handle appraisals for insurance purposes.

—o—

Texas Engineering & Mfg. Co., Dallas, has signed contracts amounting to approximately $400,000 to rehabilitate aircraft for foreign governments. Principal contracts are with Venezuela, the Philippines and Canada.

—o—

General Motors Corp. has won the National Safety Council's award of honor for distinguished service to safety, for the fifth time. GM gained the honor previously in 1942, 1943, 1944 and 1947.

—o—

Reynolds Metals Co., Richmond, Va., has appointed Horne-Wilcon Inc., Atlanta, as a distributor of aluminum products for the Florida territory.

—o—

Reltool Corp., Milwaukee, maker of metal cutting tools, has purchased a plant at 4540 W. Burnham St., Milwaukee, which will provide 20,000 square feet of adidtional manufacturing space.

—o—

Newport News Shipbuilding & Dry Dock Co., Newport News, Va., is preparing an extensive modernization and plant expansion program to take care of its rising business. Its backlog of orders stood at $199 million at the close of 1948, compared with $54 million a year earlier.

—o—

Harry Ferguson Inc., Detroit, manufacturer of tractors and farm implements, has appointed Motor Power Equipment Co., St. Paul, as a distributor for Minnesota.

—o—

Link-Belt Co., Chicago, manufacturer of chain, power transmission and conveying machinery, has moved its Spokane, Wash., warehouse and district sales office to new and larger quarters at North 1303 Washington St.

—o—

Twin Coach Co., Kent, O., has delivered the first production model of its newest product, a trolley coach, to San Francisco Municipal Railways.

—o—

Concrete Reinforcing Steel Institute, Chicago, announces a $500 annual award for research contributing to the advancement of reinforced concrete, contributions to theory of design or improvements in construction practices. Entries must be received by the institute by May 1 to be eligible for this year's award.

—o—

Allis-Chalmers Mfg. Co., Milwaukee, was low bidder on a contract to furnish four 57,500 horsepower hydraulic turbines for the power plant at the Fort Randall dam and reservoir project on the Missouri river in South Dakota with a bid of $2.5 million.

—o—

American Steel & Wire Co., Cleveland, U. S. Steel Corp. subsidiary, has established a Research Division in its industrial relations department to study labor contracts and industrial relations policies.

BOSCH MERGES

STOCKHOLDERS of American Bosch Corp., Springfield, Mass., have approved consolidation of Amra Corp., Brooklyn, N. Y., into their company. American Bosch will be the surviving firm.

Amra, a holding company will cease to exist and Arma, wholly owned operating subsidiary of Amra, will become a wholly owned subsidiary of American Bosch. Both operating companies are non-competitive manufacturers of high precision products, American Bosch in diesel fuel injection and automotive electric equipment and Arma as a supplier for the armed services.

Marcus Transformer Co. Inc., Hillside, N. J., has named Robert A. Young & Co., Los Angeles, as its territorial representative in southern California and Arizona.

—o—

Charles H. Besly & Co., Chicago, has opened a new office at 7376 Grand River Ave., Detroit. E. W. Hutchinson will be in charge of the Grinder and Abrasive Divisions, while J. E. White will be in charge of tap sales.

—o—

R. M. Hollingshead Corp., Camden, N. J., has acquired manufacturing and marketing rights to New Metal and Plastic Patch developed by Howard Paint Division, Reconditioning Products, Cleveland, for use by the autobody paint and repair industry. Distribution of the product will be through the Whiz Automotive Division under a new trade name, Whiz-Met-L-It.

—o—

Radio Manufacturers Association reports its members shipped 354,314 television receivers in the fourth quarter of 1948, 88 per cent more than in third quarter. In the entire year, 802,025 sets were shipped.

—o—

Consolidated Western Steel Corp., Los Angeles, subsidiary of U. S. Steel Corp., has opened a sales office at 1729-30 Exchange Bldg., Seattle. Hanford Haynes, formerly president of Commercial Boiler Works, Seattle, is in charge.

—o—

Remington Rand Inc., Buffalo, will consolidate production of tabulating and accounting machines at Plant No. 2 in Ilion, N. Y., within a few months. Plant No. 1 in Ilion, which has been making accounting machines, will be used for foundry work and storage. A third plant in the city makes screw machines.

—o—

Tube Turns Inc., Louisville, has named A. B. Judd Supply Co., Houston, Tex., as a distributor of welding fittings and flanges.

—o—

Rust Furnace Co., Pittsburgh, has designed and will build a double-fired billet heating furnace with a top outlet for waste gases at Pueblo, Colo., for Colorado, Fuel & Iron Corp. The unit will have a capacity of 60 tons per hour when heating 24-foot billets. Construction will begin early this year.

—o—

A. Milne & Co., New York, has opened a sales office and warehouse in San Francisco at 1245 22nd St. R. D. Cortelyou will be Pacific Coast manager.

—o—

Linde Air Products Co., a unit of Union Carbide & Carbon Corp., New York, has opened a new plant at Albuquerque, N. Mex., for production of acetylene.

—o—

American Cladmetals Co., Carnegie, Pa., has named Williams & Co. Inc. as it sales agency for western Pennsylvania, Ohio, Kentucky and West Virginia for cladmetals.

—o—

Continental Can Co., New York, will soon begin construction on a plant on the North Port Washington road, Milwaukee, for manufacture of beer cans, food containers and bottle caps.

The Business Trend

INDUSTRIAL activity as shown by STEEL's industrial production index returned to 171 per cent (preliminary) of the 1936-1939 average in the week ended Mar. 12, following a one point dip in the preceding week. It is still too early to predict whether the 171 per cent level is the plateau slightly below postwar peaks at which a number of economists have stated that industry would operate this year, but a glance at the accompanying chart shows that the level of industrial activity in the early weeks of this year has been at or near this mark regularly.

STEEL—Responsible for this one point advance in the index was the record production of steel for ingots and castings in the week ended Mar. 12. Reports from STEEL's district editors indicated that approximately 1,853,000 tons of steel for ingots and castings were turned out by the nation's steelmakers during the week.

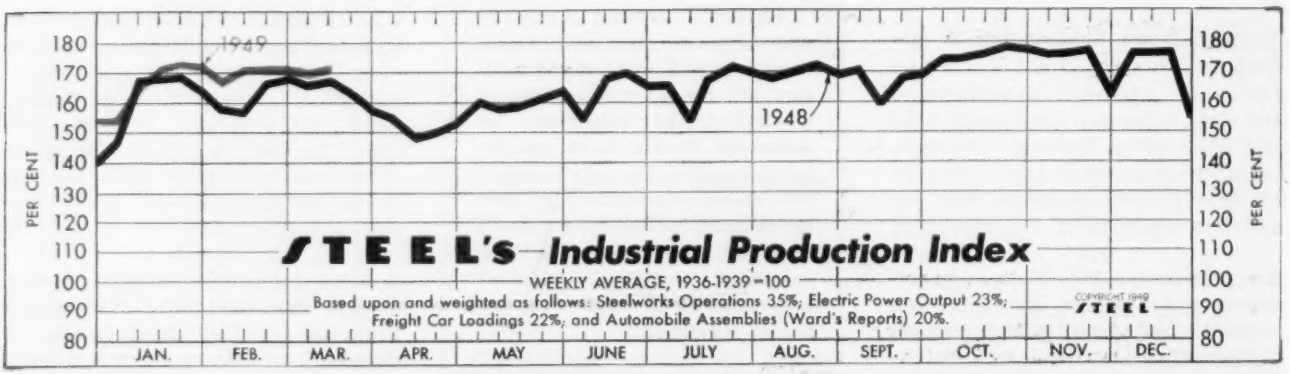
AUTOMOBILES—An old story, a supplier's strike, caused passenger car and truck assembly volume to drop to 113,903 in the week ended Mar. 12, compared with the revised total of 118,267 for the preceding week. Lack of automobile frames hampered assemblies at the plants of a major builder, resulting in the loss of three days' production at several divisions. U. S. plants passed the 1 million mark in vehicles built in 1949 during the week and outturn is expected to continue to improve with a better supply of steel in the offing.

COAL—Bituminous coal production continued at a low level during the week ended Mar. 5, aggregating 10.3 million net tons, as compared with 13.2 million net tons in the corresponding week of 1948. Stockpiles which are at postwar highs will drop considerably in the next two weeks as a result of the miners' walk-out.

CONSTRUCTION—Volume of contracts awarded for building and heavy engineering works in the 37 states east of the Rockies was lower in February than in the same month last year but showed a marked improvement over January's volume. Total awards in February aggregated $568.5 million, up $85.5 million from January. In the first two months of this year, 39 per cent of all awards reported were for projects classified as publicly owned. Government work rose to 44 per cent of all awards in February.

RAILROADS—Class 1 railroads of the United States had an estimated net income, after interest and rentals, of $14 million in January, compared with $19 million in January, 1948. The Association of American Railroads reports that, prior to payment of interest and rentals, net railway operating income amounted to about $33.2 million.

PRICES—The weekly wholesale price index of the Bureau of Labor Statistics advanced fractionally to 159 per cent of the 1926 average in the week ended Mar. 8, from 158.8 per cent in the preceding week. The index for metals and metal products continued its slow decline during the week, dropping 0.1 point to 177.8 per cent of the 1926 average.



Index (chart above): Week ended Mar. 12 (preliminary) 171 Previous Week 170 Month Ago 171 Year Ago 167

BAROMETERS of BUSINESS

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	100.5	99.5	100.0	95.5
Electric Power Distributed (million kilowatt hours)	5,530	5,552	5,722	5,285
Bituminous Coal Production (daily av.—1000 tons)	1,722	1,802	1,893	2,197
Petroleum Production (daily av.—1000 bbl)	5,123	5,187	5,330	5,256
Construction Volume (ENR—Unit $1,000,000)	$184.6	$118.6	131.2	$96.0
Automobile and Truck Output (Ward's—number units)	113,903	118,267	108,911	114,689

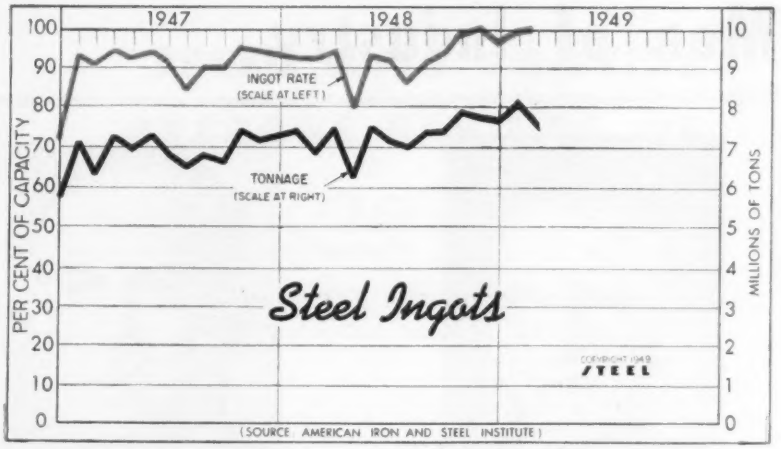
* Dates on request. † 1949 weekly capacity is 1,843,516 net tons. 1948 weekly capacity was 1,802,476.

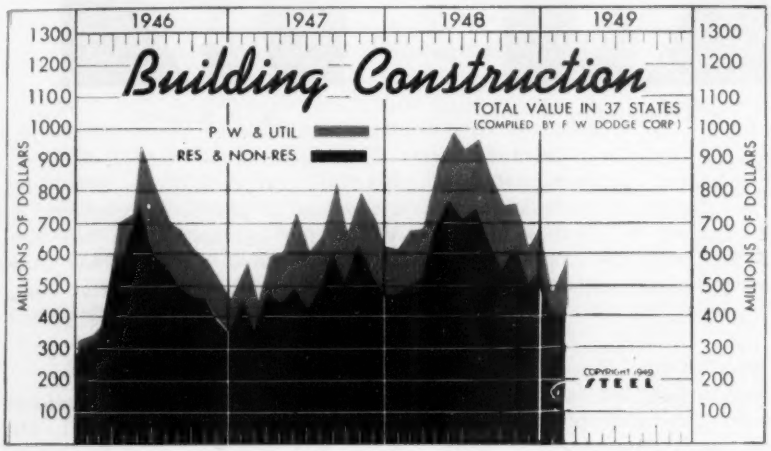
TRADE				
Freight Carloadings (unit—1000 cars)	711†	706	699	797
Business Failures (Dun & Bradstreet, number)	179	185	192	102
Money in Circulation (in millions of dollars)‡	$27,577	$27,577	$27,557	$28,006
Department Store Sales (changes from like wk. a yr. ago)‡	−9%	−7%	−4%	+5%

† Preliminary. ‡ Federal Reserve Board.

Steel Ingots

	Production (Net Tons—000)			Operating Rate (% of Capacity)		
	1949	1948	1947	1949	1948	1947
Jan.	8,183	7,473	7,213	100.2	93.6	93.2
Feb.	7,464	6,940	6,422	101.2	93.0	91.9
Mar.	....	7,608	7,307	....	95.3	94.4
Apr.	....	6,218	7,043	....	80.4	93.9
May	....	7,572	7,329	....	94.8	94.7
June	....	7,256	6,969	....	93.8	92.9
July	....	7,067	6,570	....	88.7	85.1
Aug.	....	7,438	6,982	....	93.1	90.2
Sept.	....	7,416	6,789	....	96.1	90.8
Oct.	....	7,987	7,560	....	100.0	97.7
Nov.	....	7,787	7,233	....	100.7	96.5
Dec.	....	7,771	7,366	....	97.5	95.4
Total	....	88,534	84,784	Ave.	94.0	93.0





Construction Valuation in 37 States

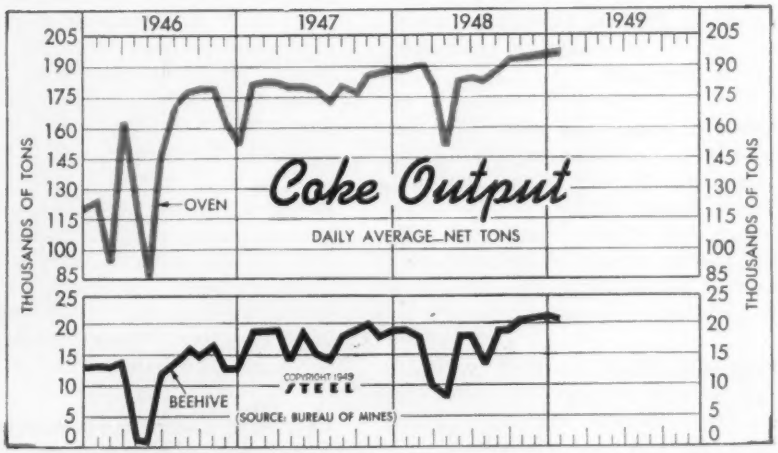
(Unit—$1,000,000)

	Total	Public Works Utilities		Residential and Non-residential	
	1949	1949	1948	1949	1948
Jan.	483.0	102.0	136.6	381.0	478.6
Feb.	568.5	153.5	177.3	415.0	504.6
Mar.	....	....	164.3	....	525.5
Apr.	....	....	184.7	....	689.2
May	....	....	205.0	....	765.8
June	....	....	215.7	....	719.5
July	....	....	217.9	....	744.8
Aug.	....	....	207.8	....	646.3
Sept.	....	....	202.7	....	559.5
Oct.	....	....	165.5	....	613.1
Nov.	....	....	106.9	....	504.3
Dec.	....	....	170.9	....	523.1
Total	....	....	2,155.3	....	7,274.1

Coke Output

Bureau of Mines
(Daily Average Net Tons)

	Oven		Beehive	
	1949	1948	1949	1948
Jan.	196,600	189,191	20,103	19,588
Feb.	.....	190,098	.....	18,625
Mar.	.....	182,340	.....	10,485
Apr.	.....	149,692	.....	8,235
May	.....	184,568	.....	18,651
June	.....	186,425	.....	18,045
July	.....	184,286	.....	14,032
Aug.	.....	188,468	.....	19,751
Sept.	.....	192,090	.....	19,616
Oct.	.....	192,440	.....	20,083
Nov.	.....	193,565	.....	20,341
Dec.	.....	195,670	.....	20,588
Ave.	.....	185,770	.....	17,338



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$12,233	$13,763	$12,568	$11,811
Federal Gross Debt (billions)	$252.0	$252.1	$252.5	$254.1
Bond Volume, NYSE (millions)	$14.8	$14.3	$16.4	$16.1
Stocks Sales, NYSE (thousands)	4,515	3,930	5,033	3,987
Loans and Investments (billions)†	$62.0	$62.0	$62.7	$63.5
United States Gov't. Obligations Held (millions)†	$33,069	$32,814	$33,268	$35,845

† Member banks, Federal Reserve System.

PRICES

STEEL's Composite Finished Steel Price Average	$97.77	$97.77	$97.77	$81.14
STEEL's Nonferrous Metal Composite‡	227.9	232.6	232.6	189.5
All Commodities†	159.0	158.8	156.9	161.0
Metals and Metal Products†	177.8	177.9	178.3	155.6

† Bureau of Labor Statistics Index, 1926=100. ‡ 1936-1939=100.

Men of Industry

STEPHEN BIANCO

P. A. THOMPSON

W. H. SEAMAN

Stephen Bianco has been appointed engineer of tests at Bethlehem Pacific Coast Steel Corp.'s South San Francisco plant, succeeding **Hubert C. Swett,** who has been named assistant general superintendent at the company's Los Angeles plant.

—o—

Melvin C. Harris has resigned as vice president in charge of production of Allegheny Ludlum Steel Corp., Pittsburgh. Pending election of a successor, **C. B. Pollock,** production manager, will be in charge of production for the company.

—o—

Alfred I. Stuart has been appointed head of the methods engineering department, Hyster Co., Portland, Oreg., manufacturer of industrial trucks and tractor equipment. He will assume charge of methods engineering for Hyster's three plants in Portland, Danville and Peoria, Ill.

—o—

Vernon H. Olson has been appointed general sales manager, W. O. Barnes Co. Inc., Detroit, manufacturer of hack saw and band saw blades.

—o—

Alfred Watson, assistant manager of the Buffalo district office of Hagan Corp., Pittsburgh, for the past two years, has been appointed manager. He succeeds **Charles A. Randorf** who is continuing his service of Hagan and other companies in Buffalo as a manufacturers' agent, and is joined by his son, Arthur, in operation of the firm of Charles A. Randorf Inc.

—o—

John D. Schneider has been appointed advertising manager of National Screw & Mfg. Co., Cleveland. His duties will include advertising and publicity for the parent company and subsidiaries, including Hodell Chain Co., Cleveland; Chester Hoist Division, Lisbon, O.; and National Screw & Mfg. Co., Los Angeles. He has been connected with the Hodell Chain Co. since 1941.

—o—

A. O. Smith Corp., Vessel Division, Milwaukee, announces establishment of a shop with complete production facilities for manufacture of heat transfer equipment, and the appointment of **P. A. Thompson** as product supervisor for heat transfer equipment. Mr. Thompson joins A. O. Smith Corp. after 18 years' association with Alco Products Division, American Locomotive Co.

—o—

Robert L. Burke has been appointed general manager, Wyzenbeek & Staff Inc., Chicago, manufacturer of Wyco flexible shaft machines, flexible shafts, flexible shaft tools and concrete vibrators. **Walter Mishler** continues as sales manager.

—o—

George N. Decker has been appointed comptroller of the Kellogg Division of American Brake Shoe Co., New York. Associated with the company since 1944 as assistant comptroller of the division, he will continue to be located at its headquarters in Rochester, N. Y.

—o—

George G. Raymond Jr., sales manager at Lyon-Raymond Corp., Greene, N. Y., has been elected vice president of the company. In addition, he will continue to act as sales manager.

—o—

Frank A. Depatie has been named manager of the newly established service department of Parker Appliance Co., Cleveland. Formerly with Standard Oil Co., N. J., where he served as a petroleum engineer in Venezuelan operations, he has also been associated with Stinson Aircraft Co. and several Detroit engineering firms in the capacity of tool designer.

—o—

W. H. Seaman, president, National Roll & Foundry Co., Pittsburgh, has been elected chairman of the board, and will continue as president. **Robert Logie,** treasurer of the company, was also elected executive vice president. **Frank C. Nash** was named secretary, **Nolan P. Banner Jr.,** assistant secretary.

—o—

W. J. Bailey Jr. has been appointed vice president in charge of West Coast operations for the recently formed Affiliated Gas Equipment Inc., Los Angeles, and general manager of the Payne Furnace Co., a division in Beverly Hills, Calif. **C. F. Cushing** has been appointed assistant general manager, in addition to his present position as director of sales.

—o—

Harold T. Chester has been appointed tramway sales engineer, American Steel & Wire Co., Cleveland, subsidiary of United States Steel Corp. He succeeds **William C. Kuhn,** who was associated with the wire company's tramway activity for more than 44 years, and who retired Jan. 1. Mr. Chester will continue to make his office in the wire company's district headquarters in New York.

—o—

Herman H. Vaughn, credit manager, National Supply Co.'s Texas Division, has been elected assistant treasurer of the company. From headquarters in Ft. Worth, Tex., Mr. Vaughn will

"SPEED NUTS* PROVIDE AVERAGE SAVINGS OF $3.00 PER UNIT"

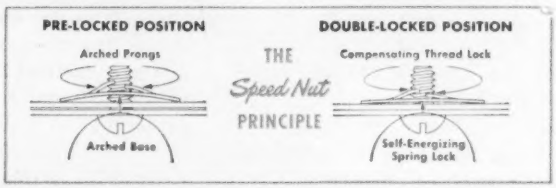
Reports HEYER PRODUCTS CO., INC.
Belleville, New Jersey

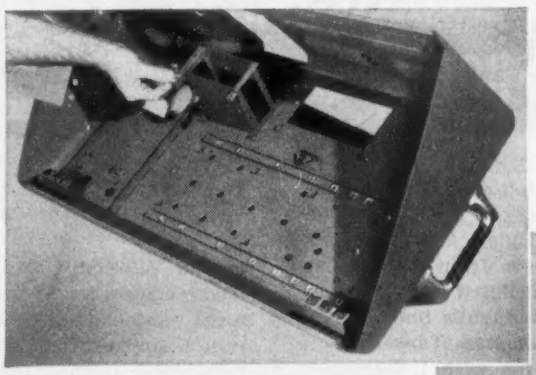
"SPEED NUTS take less time, effort and skill to apply. They eliminate assembly steps such as welding and riveting. And they greatly reduce our handling and inventory problems".

These are the reasons why Tinnerman SPEED NUTS save Heyer Products $3.00 per unit on their new automotive distributor stroboscope. A recent study of time and cost records revealed this remarkable SPEED NUT Savings Factor.

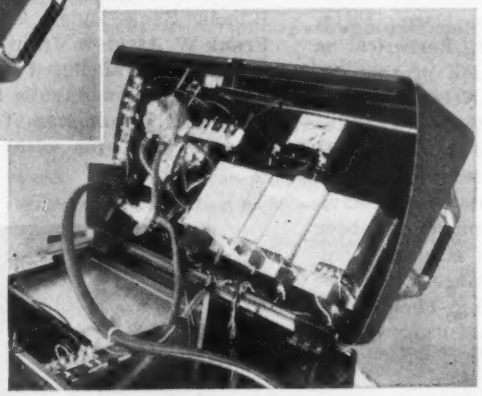
Many manufacturers, like this important producer of automotive test equipment and battery fast chargers, rely on the SPEED NUT brand of fasteners to reduce assembly costs.

If you're interested in holding down spiraling costs, find out now about our Fastening Analysis Service. Just call the nearest Tinnerman office, or write us for details. Tinnerman Products, Inc., 2040 Fulton Road, Cleveland 13, Ohio. Sales offices in principal cities. *In Canada:* Dominion Fasteners Limited, Hamilton. *In England:* Simmonds Aerocessories, Ltd., Treforest. *In France:* Aerocessoires Simmonds, S. A., Paris.

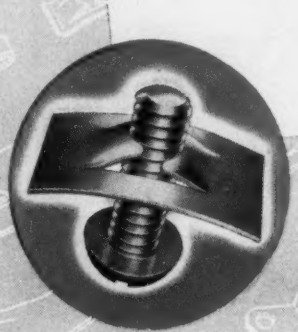




1. At left—SPEED NUTS are being positioned by hand on the inside of control panel on the distributor stroboscope. These self-retaining SPEED NUTS hold themselves in position for blind assembly attachment of controls and instruments.



2. The finished control panel, right, shows the number of precision instruments held by secure, vibration-proof SPEED NUTS.



TINNERMAN Speed Nuts

*Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS

supervise credit and collection matters in the Midwest Division, covering Kansas and Oklahoma and the Texas Division. **Wallace P. Smith** succeeds Mr. Vaughn as credit manager in the Texas Division.

—o—

Edmund Pfeifer, member of the Coatesville, Pa., district sales staff of Lukens Steel Co., will become assistant district manager of sales of the Boston office of the company. He will assist **H. G. Austin,** who will continue as manager of sales in the Boston office. **Charles H. Pyle** has been appointed to take over the territory in York, Pa., and vicinity formerly handled by Mr. Pfeifer, and will continue to operate out of the Coatesville district sales office.

—o—

Harry T. Galloway has been appointed superintendent of the Strode Ave. plant of By-Products Steel Co., division of Lukens Steel Co., Coatesville, Pa. He succeeds the late **Howard G. Rudisill.**

—o—

Dr. Morris A. Steinberg of the Metallurgical Division of Horizons Inc., Princeton, N. J., has been appointed head of the division.

—o—

John T. Robertson has been elected to succeed the late **John A. Grass** as president of York Corrugating Co., York, Pa. He served from 1930 to 1948 as sales manager, Wholesale Division, and since 1948 as vice president.

—o—

G. L. MacLane Jr. has been appointed assistant manager, engineering laboratories and standards department, Westinghouse Electric Corp., Pittsburgh, and **Dr. L. J. Berberich** as manager, liaison section of this department. **John M. Nelson** has become manager of meter sales, Meter Division, Newark, N. J., and **J. F. Chapman** succeeds Mr. Nelson as manager of relay sales, same division. **John Z. Linsenmeyer** has been appointed manager of mining, petroleum and chemical engineering for the corporation, succeeding **Phelan McShane,** appointed consulting mining engineer for the company.

—o—

W. A. Green has been named manager of special accounts sales, consisting mainly of sales to oil company marketers, in the Associated Lines Sales Division, B. F. Goodrich Co., Akron.

—o—

Establishment of a new district in the Eastern Division of Oil Well Supply Co., to be known as the Ohio-West Virginia district and comprising the former Ohio and West Virginia-eastern Kentucky districts, was announced by **C. H. Mayard,** Eastern Division manager of this United States Steel Corp. subsidiary. **H. C. Wright** has been named manager of the new district, whose headquarters will be at Charleston, W. Va. Mr. Wright was district manager for the Ohio district. **R. W. Pittman,** formerly manager of the West Virginia-eastern Kentucky district, has transferred to the production planning and procurement department at Oil Well Supply Co., Dallas.

—o—

Russell J. Skinner has been appointed assistant district manager of United States Steel Supply Co., St. Louis, subsidiary of United States Steel Corp. He has been office manager.

—o—

Whipple Jacobs, president, Phelps Dodge Copper Products Corp., New York, has been appointed chairman of the Industrial Problems Committee of the National Association of Manufacturers.

—o—

Rear Adm. William Granat, U. S. N. (Ret.), has resigned as treasurer of Lester B. Knight & Associates Inc., consulting engineer, Chicago.

—o—

E. Horton & Son Co., Windsor Locks, Conn., announces appointment of **Joseph L. Lynch** as advertising manager, **Paul E. Dillberg** as superintendent of the Drill Chuck Division, and **Steven J. Ludwin** as superintendent of the Lathe Chuck Division.

—o—

Steel Construction Co., Birmingham, has opened offices in the Continental Illinois Bank Bldg., Chicago, with **Frank W. Atchison Jr.** in charge. This company is affiliated with Ingalls Iron Works Co., Ingalls Shipbuilding Corp. and Birmingham Tank Co. Mr. Atchison has been with Ingalls Iron Works Co. for the past 14 years, having served in the design, estimating and sales departments.

—o—

R. D. Cortelyou has been appointed Pacific Coast manager for **A. Milne & Co.,** with headquarters in San Francisco.

—o—

William M. Dougherty was elected secretary of United States Rubber Co., New York, to succeed the late **Eric Burkman.** Mr. Dougherty has been associated with the company for 26 years, and recently has served as assistant to the president.

—o—

Charles M. Mooney has been appointed a special representative on engineering development at the World headquarters, New York, for International Business Machines Corp.

—o—

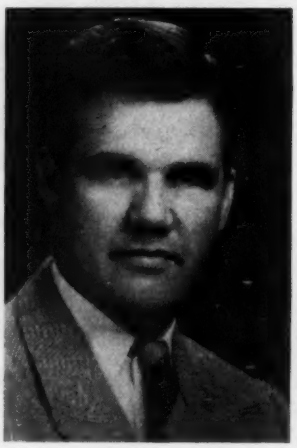
Robert E. Rielly has joined Chas. Taylor Sons Co., Cincinnati, manufacturer of special, high temperature refractories, as assistant to **Robert W. Knauft,** vice president in charge of sales.

—o—

S. W. Corbin has been appointed assistant manager, Industrial Divisions, General Electric Co.'s apparatus department, Schenectady, N. Y. He also is manager of the Resale Industries Division, a position he assumed in 1943, and will retain along with his new appointment. **Robert G. Baumann** has joined the company's chemical department, Pittsfield, Mass., as assistant sales manager of silicone products, with headquarters at the company's new plant at Waterford, N. Y.

—o—

Warren W. Smith has been named sales manager for Western Manufacturers Associated, recently formed trade organization of small manufacturing and metalworking plants in



JOSEPH L. LYNCH

S. W. CORBIN

ELIMINATE
MACHINE READJUSTMENTS

OFF WITH THE OLD
ON WITH THE NEW
. . . and Start Grinding!

Increase Production with these new
precise NORTON *Internal* GRINDING WHEELS

- Precise Size
- Precise Balance
- Precise Grinding Action

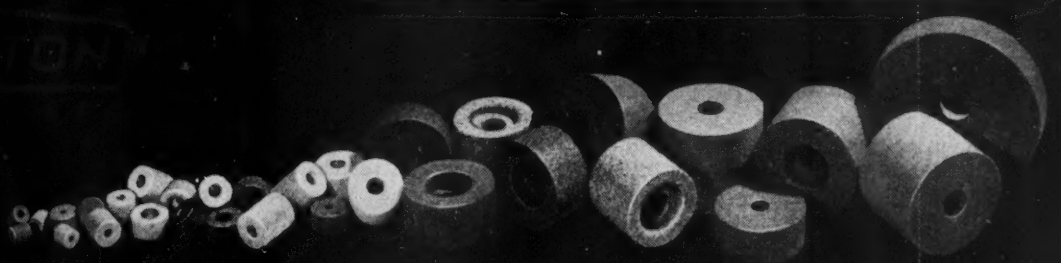
And Faster Service, Too
The new Norton manufacturing process with its electric kilns produces these improved internal grinding wheels in hours instead of days. This means greatly improved delivery service.

BECAUSE internal grinding wheels are small, they wear out quickly. Thus wheel changes are frequent and any reduction in wheel-change time can materially increase production. That's why the new Norton "precision-made" internal grinding wheels are so popular.

The grinding action of these new wheels is so uniform—not only in each lot but from lot to lot as well—that there's no lost time for machine readjustments when wheels are changed. The operator just slips off the worn wheel, snaps on a new one, starts grinding, ***no fussing with feeds and speeds.*** He gets just the same grinding action that he had a few seconds before, or the day before, or the week before.

Produced by a radically new, Norton-developed manufacturing process, these wheels have a uniformity in dimensions and in grinding action far ahead of anything previously obtainable in a ceramic product.

W-1227A



NORTON COMPANY, WORCESTER 6, MASS. · Warehouses in Five Cities · Distributors in All Principal Cities

the Los Angeles area. Mr. Smith will head up a sales campaign designed to help the association's member plants meet increasing business competition. He has been associated with Pacific Coast industry for the past 25 years in sales and technical capacities.

—o—

Donald C. Duvall has been appointed chief industrial engineer for the Monessen and Allenport, Pa., plants of Pittsburgh Steel Co., Pittsburgh. **Carl A. Breuer** has been appointed chief of production planning for the same plants.

—o—

Stan Wilson has been appointed general sales manager, Aviation Maintenance Corp., Van Nuys, Calif.

—o—

Ellsworth E. Johnson Jr. has been named purchasing agent of National Motor Bearing Co.'s Redwood City, Calif., division. He succeeds **Beverly Holmes,** who recently was promoted to plant manager.

—o—

Edward D. Wiard has been appointed to represent Illinois Tool Works, Chicago, in the Detroit territory. He will be in charge of the company's sales office at East Grand Blvd.

—o—

O. L. Earl, vice president, Acme Aluminum Foundry Co., Chicago, has been named 1949 chairman of the Associates Committee, American Washer & Ironer Manufacturers' Association. **H. P. Nelligan,** president, Easy Washing Machine Corp., Syracuse, N. Y., is president of the association for 1949.

—o—

John C. Oliver has joined the staff of Porcelain Enamel Institute, Pittsburgh, as assistant to managing director, **Edward Mackasek.**

—o—

Hettie M. Dawes has been appointed comptroller of Avondale Marine Ways Inc., Westwego, La., succeeding **Henry Z. Carter,** recently made general manager.

—o—

Harry H. Bascom, assistant traffic manager in charge of the Chicago traffic department of Youngstown Sheet & Tube Co., Youngstown, will retire Apr. 30 after more than 32 years of service with the company.

—o—

J. J. Morsman has resigned as a member of the board of directors, National Lead Co., New York. In 1929 he became assistant manager of the Chicago branch of the company, and nine years later was elected a director. **O. D. Niedermeyer** has been appointed manager, Texas

JAMES W. OWENS

Mining & Smelting Division, National Lead Co., which places the company's antimony smelting operations under his direction.

—o—

James W. Owens has opened consulting offices in Beloit, Wis., offering services that will cover administrative and technical fields of industrial engineering, his major specialty of welding, and industrial standardization, of which he is also recognized as an authority. Associated with Fairbanks, Morse & Co. since 1935, he had previously organized the National Weld Testing Bureau, a division of the Pittsburgh Testing Laboratory, and was its first director.

—o—

Appointments in the sales department of Fuller Mfg. Co.'s Transmission Division, Kalamazoo, Mich., are announced as follows: **J. A. Packard,** manager original equipment sales; **L. C. Butler,** manager service sales; and **B. S. Tooker,** service manager.

—o—

R. C. Sebold has been named to the newly created post of director of engineering for Consolidated Vultee Aircraft Corp., San Diego, Calif.

—o—

George M. Fisher, for 25 years superintendent of Studebaker Corp.'s Body Division at South Bend, Ind., and a veteran of 45 years, has retired. He is succeeded by **C. H. Smith,** who has been assistant superintendent of the division.

—o—

A. C. Moore has been appointed vice president of manufacturing, Ford International Inc., Detroit. He resigned as factory manager of the Plymouth Motor Division to join the Ford organization, and has been associated with Chrysler Corp. in Chicago and Detroit since 1943.

—o—

John H. Loux has resigned as Chicago representative with Loftus Engineering Corp., Pittsburgh, in order to devote full time to installation of industrial communication and electronic equipment for Farmers Engineering & Mfg. Co., Pittsburgh. Mr. Loux will retain offices at 185 N. Wabash Ave., Chicago.

—o—

John D. Saussaman, Fontana, Calif., was presented with the J. E. Johnson Jr. award of the American Institute of Mining & Metallurgical Engineers at its meeting held in San Francisco. Mr. Saussaman won the award for a paper entitled "Sinter Practice, Kaiser Co. Inc., Fontana."

—o—

Walter F. Benning has been appointed chief engineer of Willys-Overland Motors Corp., Toledo, O., and **Philip C. Johnson** has been appointed assistant chief engineer. Mr. Benning has been vice president in charge of engineering for the past two years.

—o—

John A. Mills has been appointed manager of heating and air conditioning sales, Demmler Bros. Co., Pittsburgh.

—o—

International Harvester Co., Chicago, announces retirement of **John E. Shanahan,** assistant comptroller, and **James C. Lanius,** formerly director of salary administration and more recently assigned to special duties by the president, after 46 years of service for both men.

—o—

The following officers were installed during the recent meeting in San Francisco of the American Institute of Mining & Metallurgical Engineers: **Lewis E. Young,** Pittsburgh, president; **Andrew Fletcher,** a vice president, was installed as treasurer as well as vice president. He is president, St. Joseph Lead Co., New York. **Edward H. Robie,** New York, acting secretary of the institute, was confirmed as secretary.

—o—

James F. Barnes, president, Barnes & Reinecke Inc., Chicago, has announced the recapitalization of the design and engineering firm, and appointment of **Thomas W. Alder** as executive vice president and treasurer. Mr. Alder was for many years secretary of Von Lengerke & Antoine, Chicago, later taking over the presidency of Blake Mfg. Co., Chicago.

—o—

Abe Cohen, president, Lynchburg Iron & Metal Co., Lynchburg, Va., has been appointed chairman of the finance committee of the Institute of Scrap Iron & Steel Inc., Washing-

ALLISON R. MAXWELL JR.
Appointed assistant general manager of sales, Pittsburgh Steel Co., Pittsburgh. Noted in STEEL, Mar. 14 issue, p. 81

LOUIS SCHIAVONE
Elected chairman of the board of directors, Schiavone-Bonomo Corp., Jersey City, N. J. Noted in STEEL, Mar. 14 issue, p. 78

RICHARD V. BONOMO
Who has been elected president, Schiavone-Bonomo Corp., Jersey City, N. J. Noted in STEEL, Mar. 14 issue, p. 78

ton. **Nathan Winski,** Northern Indiana Steel Supply Co. Inc., Michigan City, Ind., has been named vice chairman of the finance committee.

—o—

Dr. Willard D. Peterson has announced association with Arthur D. Little Inc., Cambridge, Mass. He previously was associate director of research and development, J. T. Baker Chemical Co.

—o—

Leo P. Gajda has been promoted from the position of chief draftsman to director of engineering, Snyder Tool & Engineering Co., Detroit. He succeeds **George D. Melling,** who held the position since 1946, and who leaves the company to form his own company in partnership with **Howard McCoy. Elwood M. Keifer** has been promoted to the office of chief draftsman.

—o—

Eugene Maddox, general sales manager, Multi-Hydromatic Welding & Mfg. Co., Detroit, has been elected to the board of directors.

—o—

Ralph G. Caouette has been appointed general manager, Pittsburgh Equitable Meter Division, Rockwell Mfg. Co., Pittsburgh.

—o—

J. C. Kimpel, secretary-treasurer, C. M. Kemp Mfg. Co., Baltimore, has been elected president, and **Edward J. Funk Jr.,** formerly chief engineer, has been elected vice president of the company.

—o—

Ziegler Steel Service Co., Los Angeles, announces appointment of the following sales representatives: **William Smiley,** formerly sales manager, Ducommun Metals & Supply Co., will handle sales in San Diego, Calif., county; **Robert C. Brinkley,** Steel-Service & Supply Co., will cover the state of Washington; **James E. Callahan** covers eastern California, western Arizona and southern Nevada.

OBITUARIES . . .

David R. Wilson, 74, former president, Willys-Overland Motors Inc., Toledo, O., and with his brother, the late Charles B. Wilson, co-founder of Wilson Foundry & Machine Co., Pontiac, Mich., died in Pontiac, Mar. 11. The Pontiac foundry was organized in 1914, and at one time was the largest gray iron foundry in the world. It is now a subsidiary of Willys-Overland, of which Mr. Wilson was president from 1936 to 1939. Ill health forced Mr. Wilson's retirement, and in recent years he had been inactive.

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Lawrence H. Lund, 52, vice president and treasurer, Westinghouse Electric Corp., Pittsburgh, died Mar. 14 after a heart attack at his office.

—o—

Harold G. Irwin Jr., treasurer, Irwin Mfg. Co. Inc., Garland, Pa., died Feb. 16.

—o—

Walter R. Brailsford, 53, chairman of the board, Athey Products Corp., Chicago, died Feb. 9 while in Palm Beach, Fla. Mr. Brailsford was also a director of Globe Steel Tubes Co., Milwaukee, Haskelite Mfg. Corp., Grand Rapids, Mich., and Indiana Steel Products Co., Valparaiso, Ind.

—o—

Charles H. Wilson, 69, chairman, Wilson Mechanical Instrument Division, American Chain & Cable Co. Inc., Bridgeport, Conn., died Mar. 9. Mr. Wilson contributed much in the development of measuring instruments. In 1920 he engaged in the development and manufacture of Rockwell hardness tester for metals, which had been devised by S. P. Rockwell, American metallurgist. In 1932 he carried on his manufacturing activities under the name of Wilson Mechanical Instrument Co., and 12 years later sold this corporation to American Chain & Cable Co. Inc. He developed pyrometers for measuring high temperatures and organized a pyrometer company in 1915 which he later sold to Foxboro Co., Foxboro, Mass.

—o—

Alfred C. Faul, 78, owner of Faul & Timmons, Buffalo, gasket manufacturer, died Mar. 11. He invented a metal gasket for high-pressure steam boilers and steel drums. Mr. Faul founded the firm 40 years ago with the late Harry Timmons.

—o—

George E. Chatillon, 70, president, John Chatillon & Sons, New York, maker of scales and cutlery, died Mar. 10.

—o—

William C. Madsen, 30, branch manager of the Gary, Ind., office in the central western sales district of Reliance Electric & Engineering Co., Cleveland, died Mar. 8 in Cleveland.

—o—

John M. Jerpe, 58, director of the suggestion plan organization for General Motors Corp., Detroit, died Mar. 10 at Indianapolis, suffering a heart attack as he was addressing a meeting of the suggestion plan committees from General Motors plants.

—o—

Myer D. Maremont, 77, chairman of the board of directors, Maremont Automotive Products Inc., Chicago, died Mar. 8.

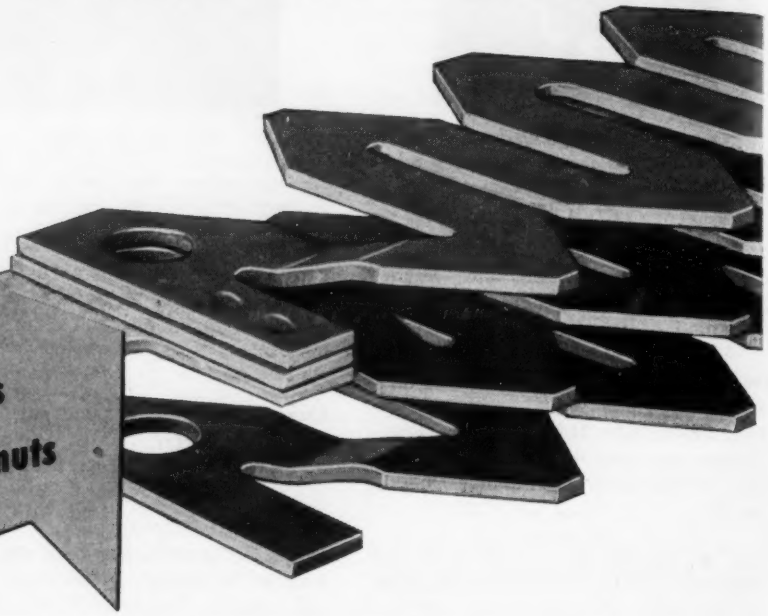
—o—

Edward Beal, 57, mechanical engineer with White Motor Co., Cleveland, since 1932, died Mar. 10.

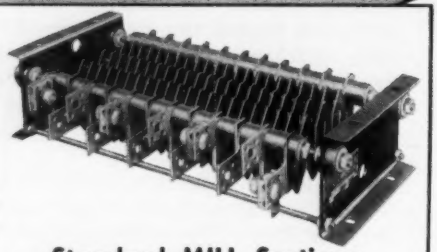
Two-way Improvement with EC&M *TAB-WELD* Resistors

1 - STABILIZES the resistance value.

2 - ELIMINATES TROUBLE in concealed areas.



OFF-SET in each plate gives Intimate Contact at grid-eyes
SPOT-WELDS insure continuous path independent of clamping-nuts



Standard MILL Sections have these features . . .

1. All grids in series—all grids of the same size.
2. Capacities up to 150 amperes per section. External paralleling of sections for larger capacities as needed.
3. Uniform mounting-hole dimensions.
4. Replacement simplified — taps in place for affixing external leads.

Usually mounted overhead or in other remote locations, electrical resistors often receive little inspection or preventative maintenance until the damage has been done. But now, the problem of burning at grid-eyes, at tap-plates, and the need for periodic tightening of clamping-nut pressure is eliminated with EC&M *TAB-WELD* Plate Resistors.

Unlike previous resistor-sections depending on end-nuts for contact-pressure, these new EC&M Resistors are designed with *Tab-ends* which are spot-welded to give a *continuous* path throughout each section. Tap-plates also, are welded in position at frequent intervals for affixing external leads. Only EC&M *TAB-WELD* Plate Resistors offer these improvements for lower up-keep—prolonged life. *And don't overlook the corrosion-resistant properties of these steel plate resistors.*

When replacing existing installations or making new layouts, use EC&M Bulletin 942 *TAB-WELD* Plate Resistors

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

Engineering News . . . AT A GLANCE

SPURS BATTERY RESEARCH—New ways of coping with the national lead supply situation is currently being revealed to the storage battery industry by the ultraviolet spectrograph. Speed and exactness of the technique in detecting and measuring minute amounts of metals used in shedding new light on which traditional battery metal specifications are really important; which available supplies can be used safely for various applications and causes of certain types of battery rejects. Setup new being used by Gould Battery Corp., Depew, N. Y., analyzes as many as 18 lead samples in 2 hours, compared to two weeks required with previous methods.

TWO-TONE FINISH—A hammered finish in two colors is provided on metal products by a new lacquer recently developed by Sherwin-Williams Co., Cleveland. Formulated primarily for manufacturers that do not have baking facilities, it is applied by spraying, air drying in about 20 minutes. The finish is suitable for products not subjected to high temperatures in service. Its cost of application is about one third less than two-coat finishes.

SPEEDS RAIL SERVICE—Recent installation of a two-way radio telephone communications system, it is learned, is currently stepping up movement of raw materials and fuel supplies over 18½ miles of track inside the Butler Armco plant. At present, five plant locomotives and two yard cranes have a loudspeaker and transmitting unit. Directions for delivery of material are issued from the yard office which represents the "heart" of the system.

SEEK PURER METAL SOLUTIONS—Research project involving the synthesis and study of a new series of chemical substances for altering properties of metal solutions is currently being undertaken by four student chemists at Clark University, Worcester, Mass., it is reported. Substances under study are called sequestering or chelating agents. These offset undesirable properties of certain metals which occur as impurities in metal processing. Project is being supported by F. C. Bersworth, president, Bersworth Chemical Co., Framingham, Mass.

"SPONGE" TITANIUM— Titanium metal is now beyond the laboratory stage according to E. I. du Pont de Nemours. At its pilot plant at Newport, Del., the company is producing the material in sponge form, and shortly expects to turn out ingots weighing up to 100 pounds—the daily capacity of the plant. The metal is reported to run 99.5 per cent and more pure. Impure titanium is brittle, but in its pure state, it is ductile and can be rolled and drawn readily. It also is resistant to corrosion, has a high melting point and weighs half as much as steel.

DOUBLE DUTY—Compressed air piping system incorporated in a 3-bay structure, recently completed by Forsyth Engineering Co., Houston, not only distributes air wherever needed, but also serves as the supporting framework for the shop. Uprights and main cross members are not usual structural beams or channels but 4 and 5-inch extra heavy pipes tied together by a clever method to permit free flow of air. Instead of customary structural welds at points of juncture, joints are made by pressure welding so area common to both vertical and horizontal member is open. Entire building framework thus is a widely distributed air reservoir taking the place of the conventional receiver installed next to the compressor. Air is further distributed by smaller diameter pipes and hoses.

WEIGHTY PROBLEM — Integration of weighing equipment in various processing lines utilized by the metalworking industry poses many problems of control—especially in those applications where automatic computation is involved. In pointing out what the weighing industry expects to accomplish in meeting these service demands, V. C. Kennedy Jr., supervisor of engineering, Streeter-Amet Co., Chicago, reveals some engineering data well worth considering where changes in weighing techniques are contemplated. (p. 102)

FINISHING TIPS — Organic finishing materials for industrial use are divided into japans, lacquers, and synthetics. As all three offer advantages and disadvantages under certain conditions, it is necessary to evaluate them from several angles before applying them to metal products. According to G. J. Cavanaugh of GE's Works Laboratory, Schenectady, N. Y. a user in making a choice must consider size, shape and end-use of the product, as well as cost and consumption of materials in relation to methods of application. (p.106)

EFFECTIVE PENETRATION — In describing five basic types of induction heating equipment available to users, Frank T. Chesnut of Ajax Electrothermic Corp., Trenton, N. J., presents some hitherto unpublished data which may help to cut down the error-margin in selecting proper heating and melting units. He emphasizes that surface conduction of high frequency currents, more than any other factor, determines when and where certain equipment should be used. Therefore, it is important to know what the effective penetration is for each charge so utmost use can be made of the current. (p.109)

CUTS LOST TIME—High pressure operation of blast furnaces, was one of the main topics discussed at the regular meeting of the Blast Furnace and Coke Association of the Chicago district recently. In reviewing the present status of this operating method, B. S. Old, Arthur D. Little Inc., Cambridge, Mass., pointed out that overall results thus far are not exactly spectacular, but records show an increased iron yield, lower coke consumption and generally better all-around performance. (p. 120)

Major changes expected in AUTOMATIC

AUTOMATIC weighing and recording devices for scales are not new. Earliest models date back for over 60 years. However, in recent times the demand for more flexible and powerful devices has spurred the application of new methods to the scale industry.

By removing the human element from many weighing operations much more accurate and consistent results are possible. Where beams are balanced by hand, or dials are read, the possibility of error through carelessness, fatigue or transposition of figures is serious. Even where type registering beams are used, careless or dishonest operation can cause major discrepancies.

Conventional scales consist of a system of levers that allow a large force to be balanced by a much smaller force. A beam scale is essentially a problem in statics, since at the time an observation is made the entire system must be in static as well as dynamic equilibrium. As a rule, the balancing force is applied either in the form of a known mass placed on a beam, the displacement of one or more pendulums, or by the deflection of a spring. In most applications damping and other dynamic considerations are not serious problems.

Complicated Problem—In the case of high speed automatic weighing the problem becomes more complicated. First it is necessary that the scale* and recorder indicate the proper weight in a very short time (frequently in less than 1.5 seconds). To accomplish this the balancing force must be applied very rapidly and the entire system must come to equilibrium in a minimum amount of time. The result may then be indicated in a variety of ways.

Basically, balancing of the system may be accomplished by one of two methods:

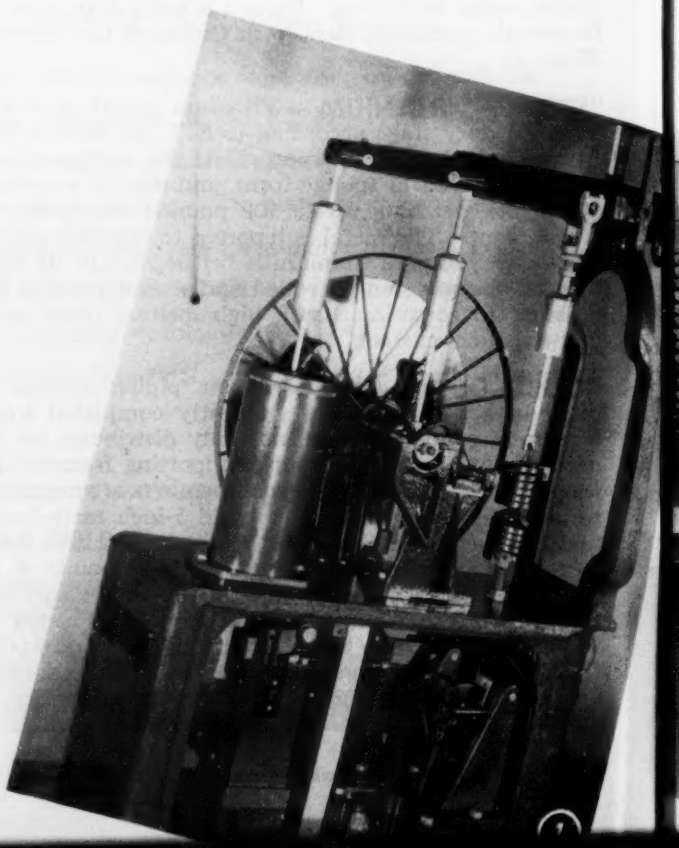
1. Sufficient power may be taken from the scale system to operate the balancing and indicating equipment.
2. The system may control some external source of power which in turn operates the indicating equipment.

There are unlimited ways in which the above results are accomplished. Both methods have their limitations and advantages.

First method is demonstrated in a spring or pendulum type system. The applied load causes a spring or pendulum to be displaced and through a mechanical linkage of some type an indicator or typewheel is positioned to show the weight. Basic limitation of this method is that as power is taken from the system, a certain inherent error is introduced into the results. This limits the amount of load that may be operated by the scale if the error is to be kept within tolerance. Damping the oscillations set up by a system of this type is most important. Equilibrium must be established rapidly, but the damping device must not cause an error in the steady state result.

Second method of automatic balancing which is achieved through the introduction of external power is in some cases much more complicated. The most obvious example is a weighmaster operating a beam type balance. Here the operator sees that the beam has gone to the top of the trig loop. He then moves the poise out to balance the load. If he overruns he will move the poise back slightly until a correct balance is attained. The entire operation may be duplicated automatically. The basic problems are common to all control equipment.

Speed with which the final result is attained and the accuracy of this result depends on many factors. The inertia of the entire system, time lags, friction and various other elements all have serious effect on the result. However, through the use of control methods



* Scale, as distinguished from the recorder, is the weighbridge, lever system and supporting members. The recorder or indicator may be a weighbeam, dial, etc.

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Weighing

Industry's demand for more flexible and powerful scales spurs application of new devices, including servos and precision strain gages, to weighing equipment

Fig. 1—Rear view of automatic weight recorder. This machine is similar to unit illustrated in Fig. 3, but smaller. The "iso-elastic" temperature-compensated spring can be seen to right of typewheel. Hydraulic dashpot is at at left. Figures indicating weight are etched on the periphery of the typewheel. Tape and printing mechanism can be seen below the shelf

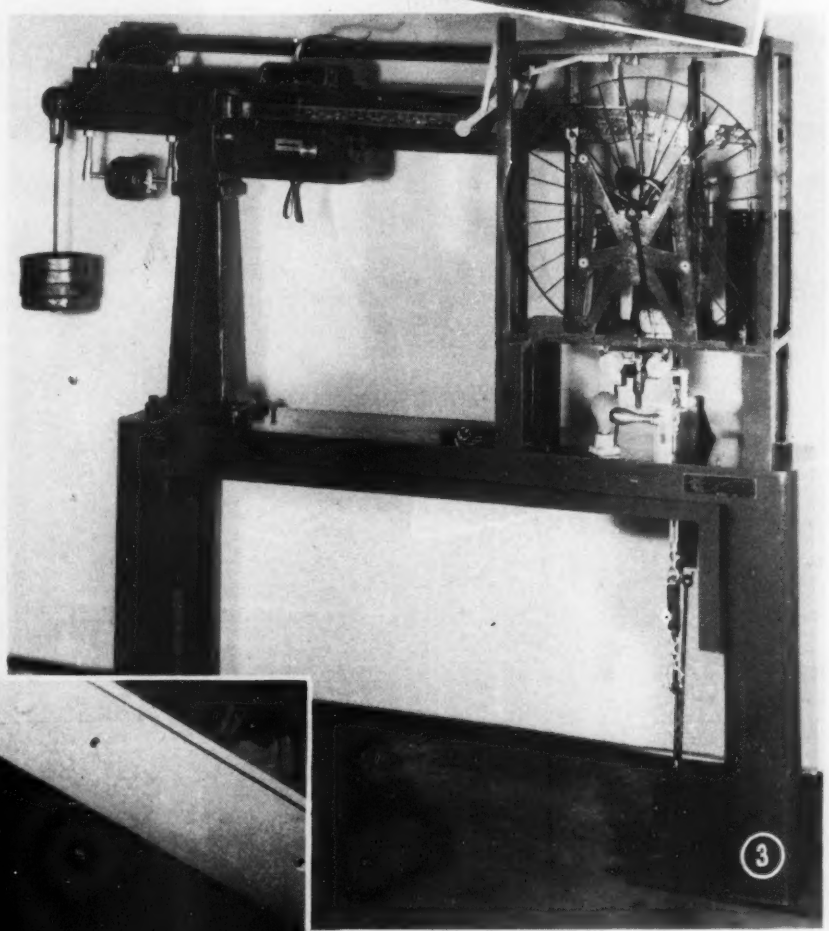


Fig. 2—Beam switches on horizontal beam weigher. Motion of beam tape is restricted to 0.020-inch. As it rises or falls it actuates the beam switch moving a poise on the back of the beam, forward or backward. Poise cannot be seen, since it is located behind the beam

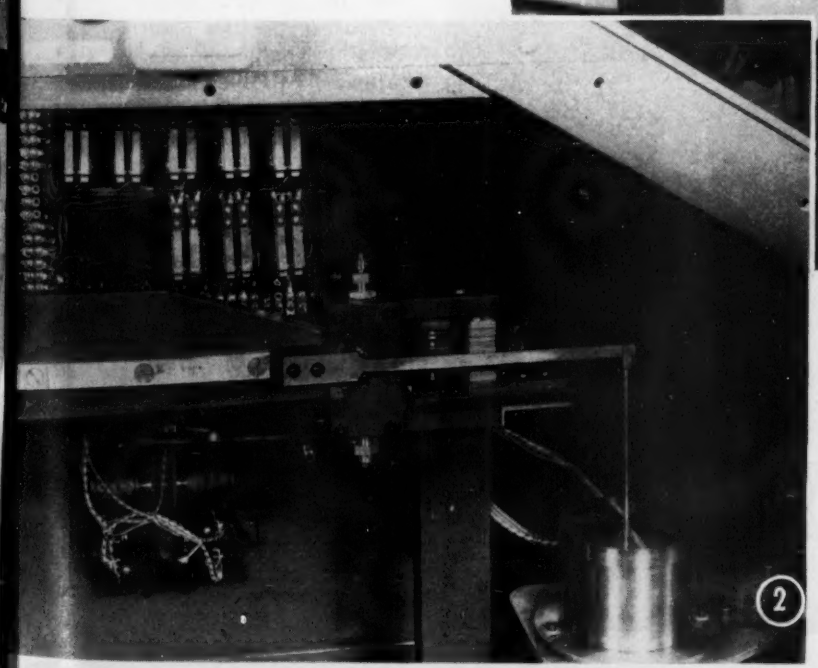
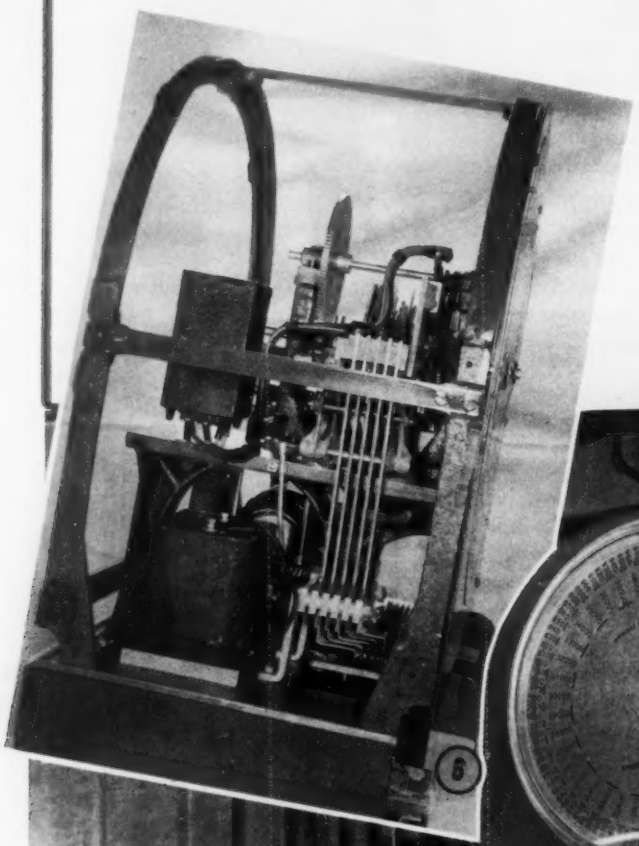


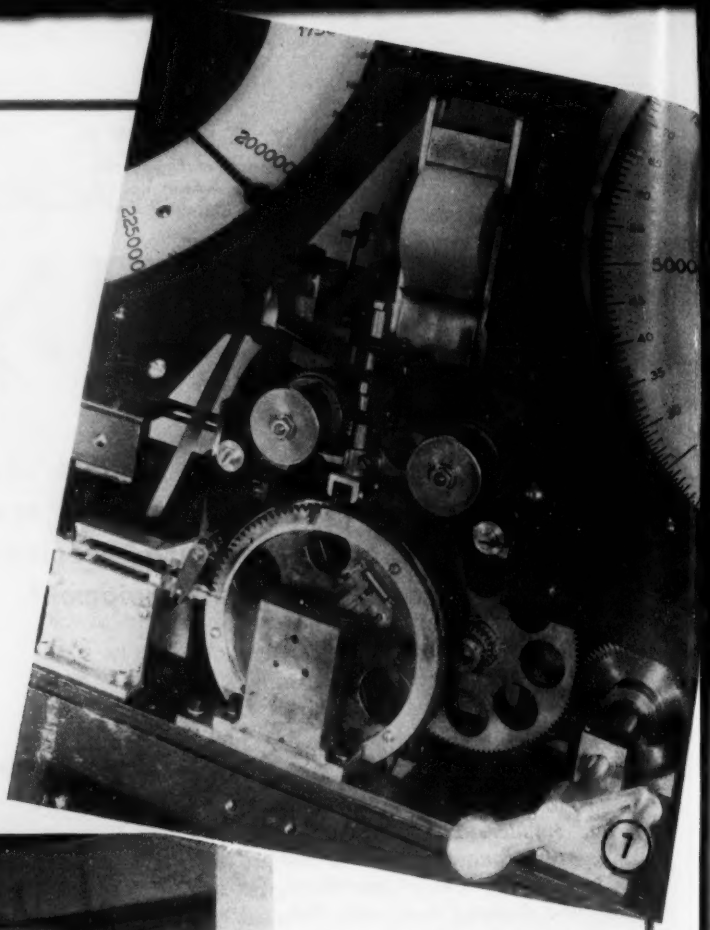
Fig. 3—Automatic weight recorder. Large type wheel at right side of recorder is positioned by the beam. Printing mechanism may be detached and load actually weighed on the beam

Fig. 4—Interior view of hydraulic dashpot. Proportional damping of the dashpot can be adjusted by setting the valve springs. As valves are opened, springs exert an increasing force on them, thereby limiting flow of fluid through valves

Fig. 5—Automatic weight recorder with servo mechanism. Follow-up servo on this recorder is seen in the lower right portion of the machine. As beam rises contact switch causes a motor to drive the lead screw until the follow-up mechanism brings it into equilibrium

Fig. 6—Interior view of servo-operated weight recorder. Step cams positioned by the servo mechanism in Fig. 5 can be seen in the center of this picture. Sensing fingers and type bars are visible





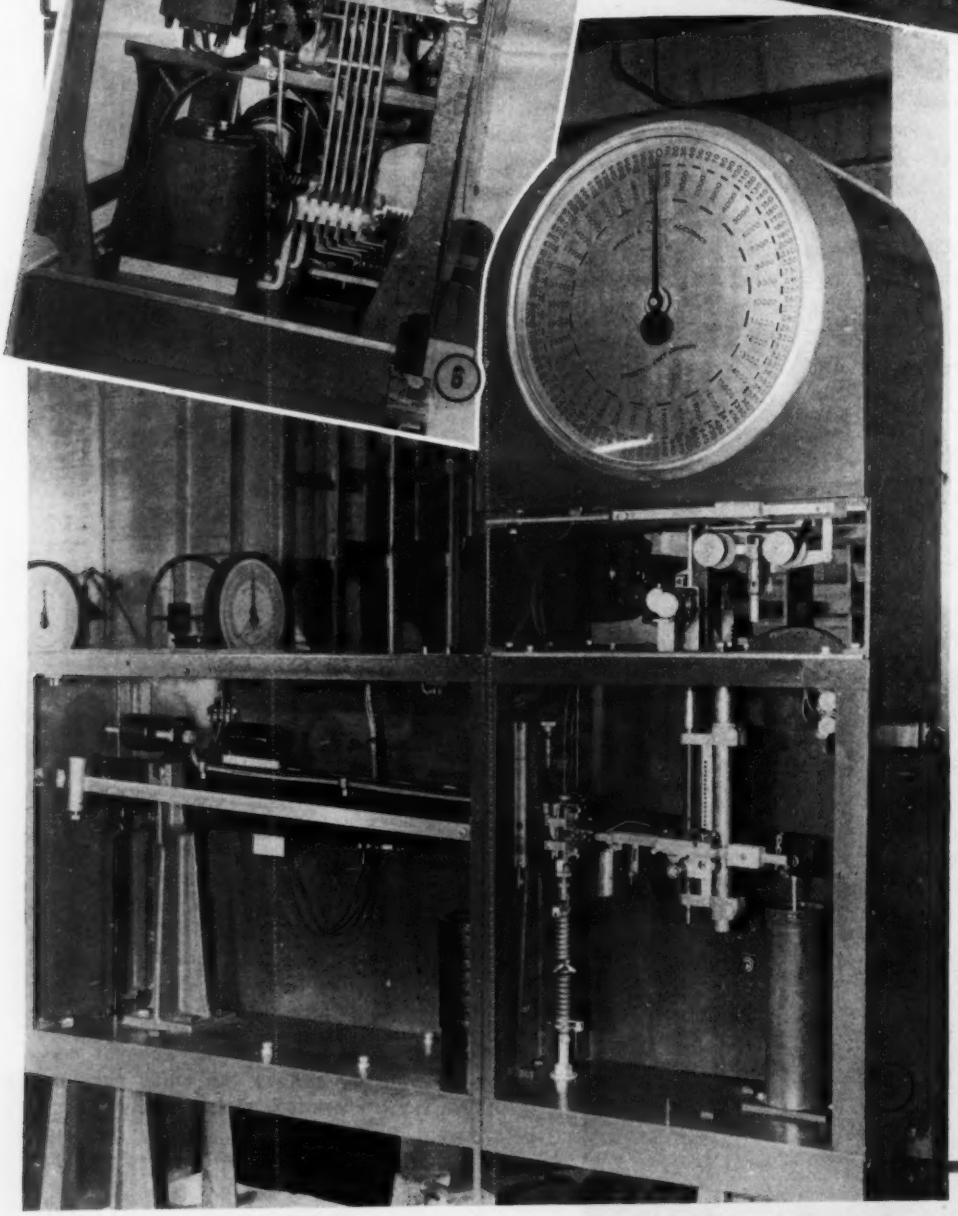
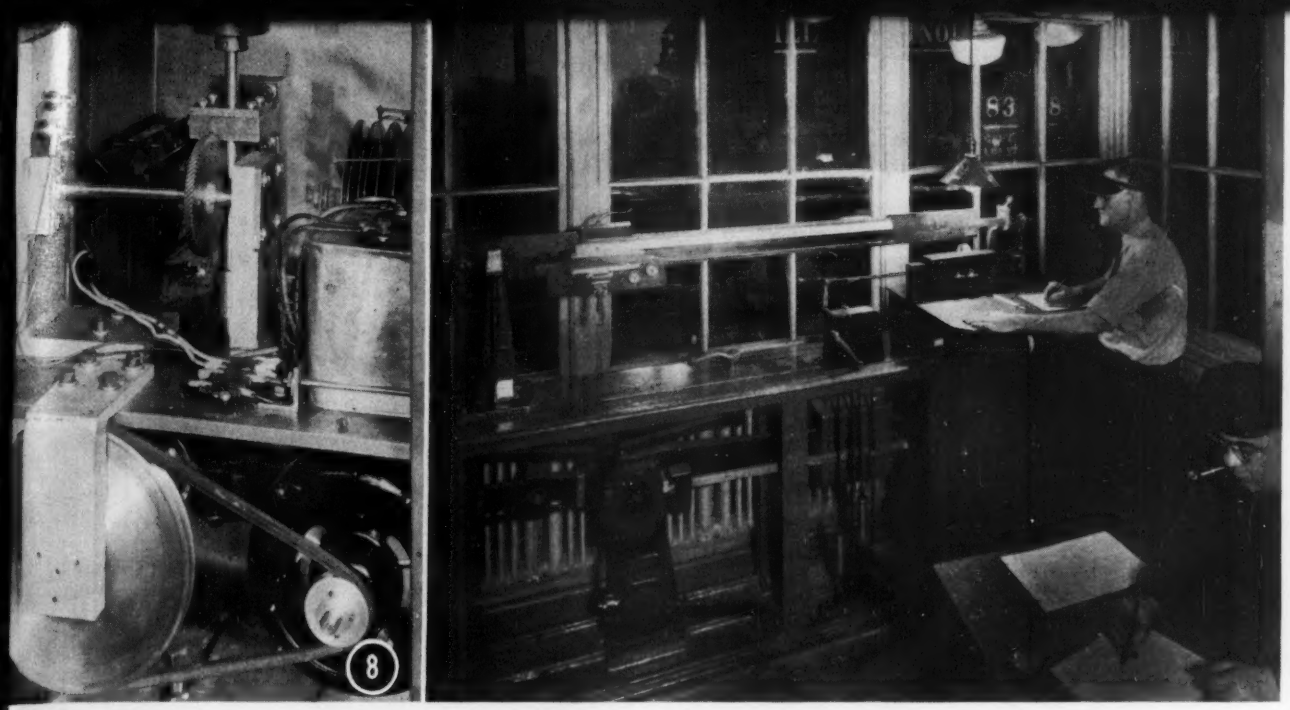


Fig. 7—Printing mechanism for special recorder. This is a view of the typewheels and printing mechanism of a servo-operated weight recorder. Raised figures on the periphery of the two small typewheels can be seen

Fig. 8—Relay type servo. Servo disk can be seen at the extreme left. A contact finger which is not visible, rests against the arcs on the servo disk. Break in the two arcs can be seen on the edge of this disk. The motor drives disk until contact finger comes to rest in the dead space between arcs

Fig. 9—Railroad track scale recorder. This automatic recorder allows freight cars to be weighed in motion. Weight of each car is printed on a tape as it crosses the scale. Upper beam is used for checking and as standby beam. Norfolk & Western photograph



there is no limit to the amount of power that may be controlled. Consequently, it is possible to operate extensive computing machinery or control devices by a scale system without causing appreciable errors in the results.

Automatic Recorders—Figs. 1 and 3 show two widely-used automatic recorders with the housing removed. The weighbeam is balanced by a spring. Attached to the beam is a rack operating a large typewheel. This wheel, along with a conventional needle and dial, indicates the weight. If rapid weighing is necessary the inertia of the wheel must be reduced to a minimum through the use of a design incorporating a very low moment of inertia; otherwise considerable oscillation will be caused. Heart of this system is the hydraulic dashpot. Since it is necessary to bring the recorder to rest rapidly, considerable power must be expended in the dashpot. It is important, however, that there is no appreciable effect on the final position of the beam.

Fig. 4 shows a cutaway view of the dashpot interior. A study of the interior will disclose how damping proportional to error is achieved. If the displacement of the beam is some distance away from equilibrium it will tend to move rapidly toward an equilibrium position. This causes a heavy flow of oil through the various parts. Since a large displacement moves the valves well out from the plate, all of the springs are brought to bear on it. As it settles lower, there is less force of the spring, and consequently, less damping. This effect is further increased by making the top springs of each set from stiffer material.

For many purposes a recorder of this type serves very well. However, size of the wheel is limited by the amount of power required to turn it. When high capacities or fine graduations are necessary the wheel must be as large as possible. It is obvious that additional work involved in turning the wheel can only be done at the expense of the accuracy of the final results.

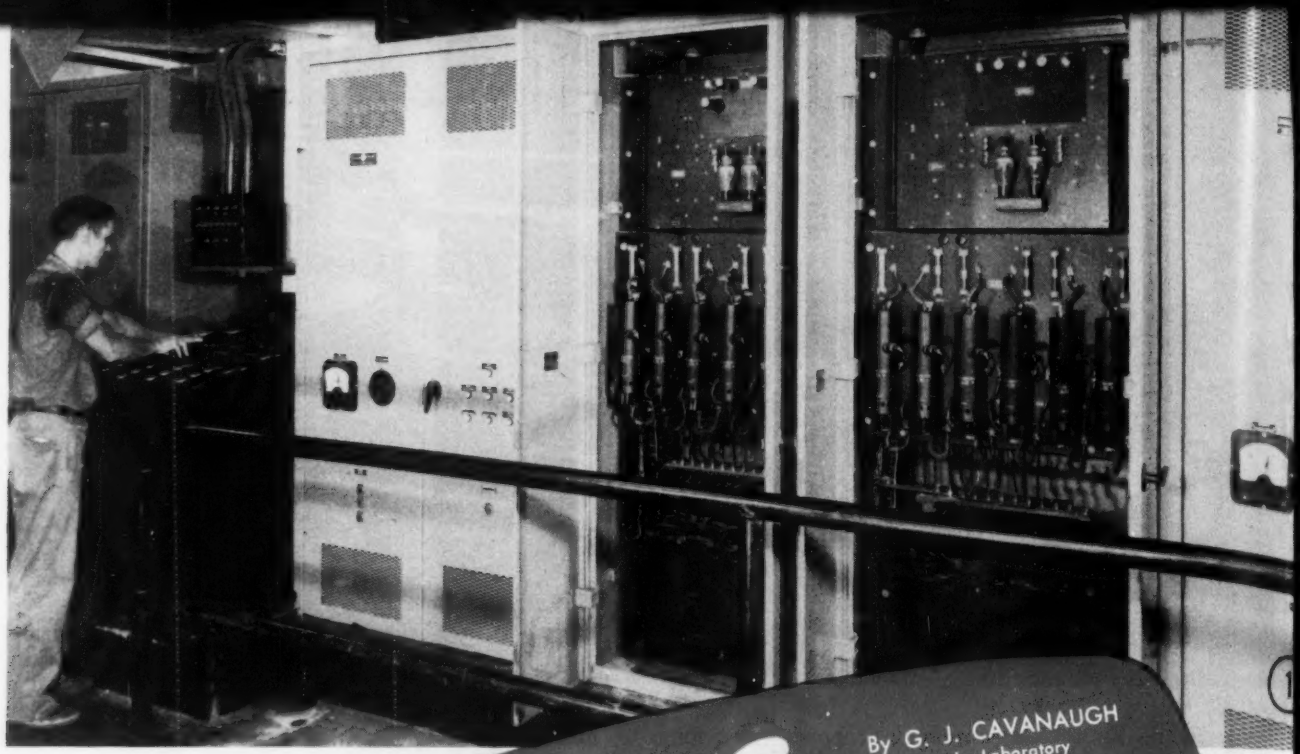
One of the most important applications of the type of recorder has been for railroad weighing. Time and equipment involved in weighing many cars is extensive. By using an automatic recorder, weighing time of each railroad car is cut from minutes to seconds, with much more accurate and dependable results being obtained.

Fig. 9 shows a motion-weighing track scale in operation. As each car passes over the scale the weight is printed on the recording tape. The problems involved in motion weighing are far greater than in dormant weighing. Equilibrium must be established in a minimum of time, or undue error will result. Likewise, vibration and shock of loading must be held in check or severe errors will result. Frequently over 2000 cars per day are weighed on this type of recorder. Consequently a rugged and dependable design is imperative.

Conveyor Scales—Another application of this type of automatic weigher is in conveyor scales. Several widely used belt or conveyor scales that are automatic recorders are on the market. Weight is determined by a weighbeam against a spring. The moving belt passes over scale borne rollers and the load is transmitted by levers to a weigh beam. The computing portion consists of an integrating device that automatically and continuously multiplies the instantaneous weight on the scale times the rate of travel of the belt. The results are given either in visual figures or may be indicated on a chart.

Increasing demand of industry for scales to operate control and computing equipment is severely limited if all the power to operate the machanism must be taken from the system. Use of a control system allows unlimited power to be available to operate external equipment. Follow-up devices and other control methods have been used with varying degrees of success for many years. During the last few years most of these devices have been referred to as "servos."

Most obvious form of automatic balancing device consists of a poise mounted on a lead screw. This is driven forward or back in response to the movement of contact points on the beam tip. Early patents on a device of this type (*Please turn to Page* 126)



APPLYING INDUSTRIAL FINISHES

By G. J. CAVANAUGH
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Choice of organic material to be used on metal products depends on many factors. Some of these, such as size, shape and service-use of the item are discussed by the author in relation to consumption of materials and methods of application

GENERALLY speaking, types of finishing materials for industrial use are divided into japans, lacquers and synthetics. Of the three, synthetics by far are the most versatile and widely used. In considering such materials for metal surfaces, a review of the characteristics, and methods of applying these finishes may aid the user in making a proper choice.

Japans are available only in black, and are of a long, high-bake nature. They can be used very well where low-cost finishing is essential. While they generally have poor solvent resistance, they are well known for their acid, alkali and moisture resistance. They also can be used advantageously on high-production items employed for indoor service.

Greatest advantage of lacquer type materials is that they air-dry rapidly without necessity of baking. Lacquers, however, do not usually lend themselves to direct-to-metal application. They must be applied over a primer, preferably a synthetic type. Also, a much better finish is assured if the lacquer is applied over a baked primer. There are some synthetic primers that air-dry fairly rapidly and make suitable undercoats for lacquer finishes. These, however, are not as durable or as trouble-free as baked undercoats.

Thickness Control Important—When using an air-dry synthetic as a primer, close control must be exercised over the thickness applied. Excessive thickness often causes lifting or shriveling after the lacquer is applied. The condition is caused by the solvent action of the lacquer on the heavy, uncured undercoat. Another condition that occurs is referred to as lacquer "craze", or check on drying. This also is caused by the stronger lacquer solvents attacking or softening the undercoat on drying. Difference in shrinkage of the two types of materials causes the lacquer to separate, giving the so-called alligator effect of cracking.

Adhesion properties of the undercoat are usually impaired, when compared to that of a baked undercoat. It is well to consider too, that the only appli-

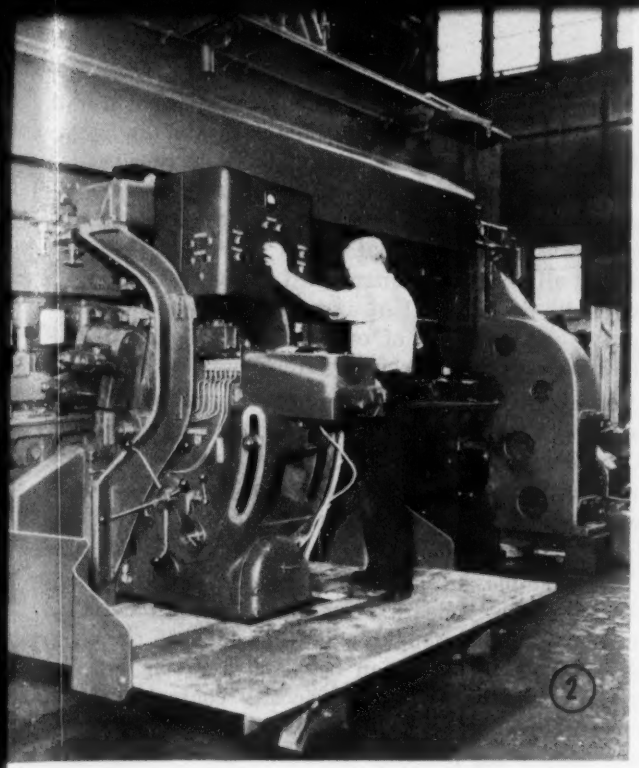

Fig. 1—Lacquer finish on these switchgear panels provides a neat, business-like look, besides maximum protection against wear

Fig. 2—Because of its ability to meet a variety of production conditions, a synthetic finish is applied on the control panel of this tool carriage used in connection with a large planer

cation method that lacquers lend themselves to is spraying.

Due to their ease of application, speed of drying and the low cost of equipment needed for their use, lacquers are very desirable materials for certain applications. Like anything else, they must be properly used. Many troubles can occur if proper control is not exercised in material application and selection.

Recently, there has been a trend toward color harmony and styling of equipment to provide attractive appearance, sales appeal and safety measures through use of color. This seems to be an ideal field for lacquer-type materials. Multiple coats can be applied and rapidly dried with masking operations facilitating applications of different colored lacquer coats on the same equipment.

Good Touch-Up Finish—Painting of large equipment where baking is impractical because of size, and where ordinary service conditions do not call for exposure to any particularly severe conditions, is another example of a suitable application for a lacquer-type finishing material. It also is suitable for touching up equipment damaged in assembly.

Generally, lacquers should be considered where baking facilities are impractical or unavailable, where floor space is limited for high production equipment, where finish requirements are not too severe, and where spray application would be advisable.

Synthetic-type materials are now widely used. They may be divided into different categories, such as long-oil air-dry, bake or air-dry, bake only, and a recently developed, very-rapid, high-bake type.

In general, the long-oil air-drying synthetic has been replaced for industrial use by the faster drying materials. However, they still find some use for structural finishing because of their excellent outdoor weathering characteristics.

Synthetics Widely Used—The air-dry or baking synthetic is perhaps the most widely employed because of its general all around ability to meet a variety of production conditions. These materials are very suitable for both large and small equipment. If baking equipment is not available, they may be readily air dried, although not quite as fast as lacquer type materials. Whenever possible, this type finish should be baked to receive the full value of the coating in respect to corrosion resistance and durability of the applied film.

Strictly heat-curing synthetics, like those used for finishing appliances such as refrigerators, washing machines and some large and small oil-filled transformer tanks where appearance, resistance to moisture, mild acids, alkali and outdoor weathering are of prime importance, are perhaps close to the ultimate in finishing systems.

Cases are reported where these materials are being applied in two coats with but one baking operation. The prime coat is applied and given approximately 5 minutes to set. A finish coat then is applied, both coats being baked at the same time. This finishing procedure besides protecting exposed equipment, cuts the baking cycle in half. Increased pro-

PROPERTIES OF ORGANIC FINISHES

Properties	Lacquers			Synthetics				Japans		
	Nitrocellulose	Ethyl Cellulose	Modified Resin	Air-Drying Oil Modified	Baking-Oil Modified	Resin-Combinations	Thermosetting	Air Drying	Oil-Modified	Resin-Modified
Cost	High	High	High	Medium	Medium	High	High	Low	Low	Low
Coating Use	Finish	Finish	Finish	Finish and Primer	Finish and Primer	Finish and Primer	Finish and Primer	Finish	Finish	Finish
Physical Properties:										
Rub Resistance	Excellent	Excellent	Excellent	Good	Good	Good	Good	Fair	Fair	Fair
Abrasion Resistance	Poor	Poor	Poor	Good	Good	Good	Good	Good	Good	Good
Impact Resistance	Poor	Poor	Poor	Good	Good	Good	Good	Fair	Fair	Fair
Adhesion	Poor	Poor	Fair	Good	Good	Good	Good	Good	Good	Good
Flexibility	Poor	Poor	Fair	Good	Good	Good	Good	Good	Fair	Fair
Chemical Properties:										
Weather Resistance	Fair	Poor	Good	Good	Good	Good	Fair	Good	Good	Fair
Oil Resistance	Fair	Fair	Fair	Good	Good	Good	Good	Poor	Poor	Fair
Acid Resistance	Poor	Poor	Poor	Good	Good	Fair	Good	Excellent	Good	Good
Alkali Resistance	Fair	Fair	Fair	Fair	Fair	Good	Good	Excellent	Good	Good
Processing Properties:										
Dip and Flowability	Poor	Poor	Poor	Good	Good	Good	Good	Poor	Good	Good
Sprayability	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Air Drying	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No	No
Baking	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes

Note: Above information is very general because of the great number of formula variations, material characteristics, slightly different results derived from each, as well as characteristics and problems of particular jobs.

duction is possible with no additional equipment.

While synthetic materials are being used in a two-coat, one-bake system on some items, it is not the general rule. The usual synthetic baking system calls for a two-coat application, with separate bakes for each coat. Quality finishes used by automotive and refrigerator manufacturers employ a two-coat, two-bake system.

Where cost is of prime importance, there are synthetic materials available that can be applied as a one-coat finish. While not quite as durable under some conditions as those used in two-coat systems, they are used widely by many manufacturers of industrial equipment as well as makers of home electrical appliances and cabinets.

One of the latest material developments of a synthetic nature is the very fast, high-temperature curing type. It is ideal for use on very light metals, venetian blinds, for example. The material is applied and baked for as short a time as 1 minute for its curing cycle.

Solids Determine Final Cost—In considering cost per gallon of finishing materials, it is well to consider percentage of solids contained per gallon of the different types as purchased. This has a very definite bearing on the cost per square foot covered. Of the three types discussed, synthetics have a much higher percentage of solids. While this is by no means the only factor in determining the cost of a finishing operation, it is important enough to be given serious thought, particularly at this time when finishing material costs have risen to such a high level.

When selecting a finishing system one should not only have some knowledge of finishing materials and systems, but should also be fairly familiar with the different application methods. Methods most commonly used industrially are spraying, dipping or flowing. Of these the spray method is undoubtedly the most widely used. It is, however, least efficient so far as material utilization is concerned. The efficiency of a spray application can, however, be increased by proper selection of spray guns and allied equipment. Makers of spray equipment have several types of spray guns with many different air-cap and fluid-tip combinations for use. Equipment used depends on type of material employed and nature of the parts being processed. Air regulators and filters are also a must for any quality spray installation. With proper equipment, it is possible to utilize 50 to 60 per cent of the paint material as it leaves the spray gun.

Engineering Raises Efficiency—Most efficient method of applying finishing materials is by the dip method—provided parts being finished lend themselves to this procedure. Other than those of large size, parts that are fabricated in such a way as to have air tight corners in them that would prevent paint from wetting all areas when immersed in the finishing material, are the only others unsuitable for dipping. In dipping, an efficiency of over 90 per cent can be realized on a well-engineered system.

To obtain full benefits from a dip operation, a relatively high production of parts should be guaranteed to justify the amount of paint in use. If product appearance is the important factor there are some items that do not lend themselves to dipping because of their shape or other physical characteristics.

For example, in dipping there are usually drain marks showing beneath holes, and a somewhat heavier film of paint along the bottom edge of the part being finished. These can be avoided within reason, by close finishing material viscosity control, and by determining the correct angle at which the parts are hung after being painted. However, there always will be some evidence of drain marks and fatty edges.

Flow Coating—While not as widely used as either spraying or dipping, flow coating offers some very interesting features. This method is essentially the same as dipping, except that instead of immersing the equipment, paint is flowed from a nozzle or a series of nozzles onto the work. Actually, the major advantage of flow coating, compared to dipping, is in the amount of paint necessary, and the fact that the paint can be directed at surfaces that cannot be painted by dipping.

Efficiency of a flow-coat operation, while very close to that of dipping, is somewhat lower. This is caused, not by a greater use of paint, but by a greater use of solvent which evaporates more readily due to greater exposure to air of mixed paint material.

One particular manufacturer has been using this technique in coating large outdoor transformers. Nothing elaborate in the way of painting equipment is used; actually it can be compared to a garden hose which uses paint instead of water. Quality and appearance of the finish is hard to beat.

In another instance, an automatic cleaning and flow-coating machine is used to process more than a million parts having more than a thousand different shapes and efficiency of this installation resulted in a tremendous savings.

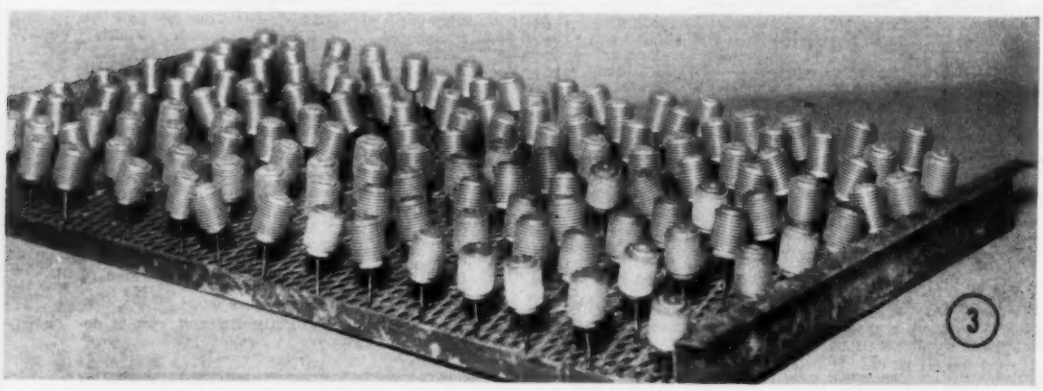

Fig. 3 — These bellows, presenting 11 convolutions in their 2-inch length, were difficult to coat properly until equipment was developed to flow-coat them. Excess material is removed by revolving the bellows at high speed

HOW to Select Induction Heating Equipment

With five distinct sources of current supply available—each with its most useful field of application—an error in choosing heating and melting equipment can be costly

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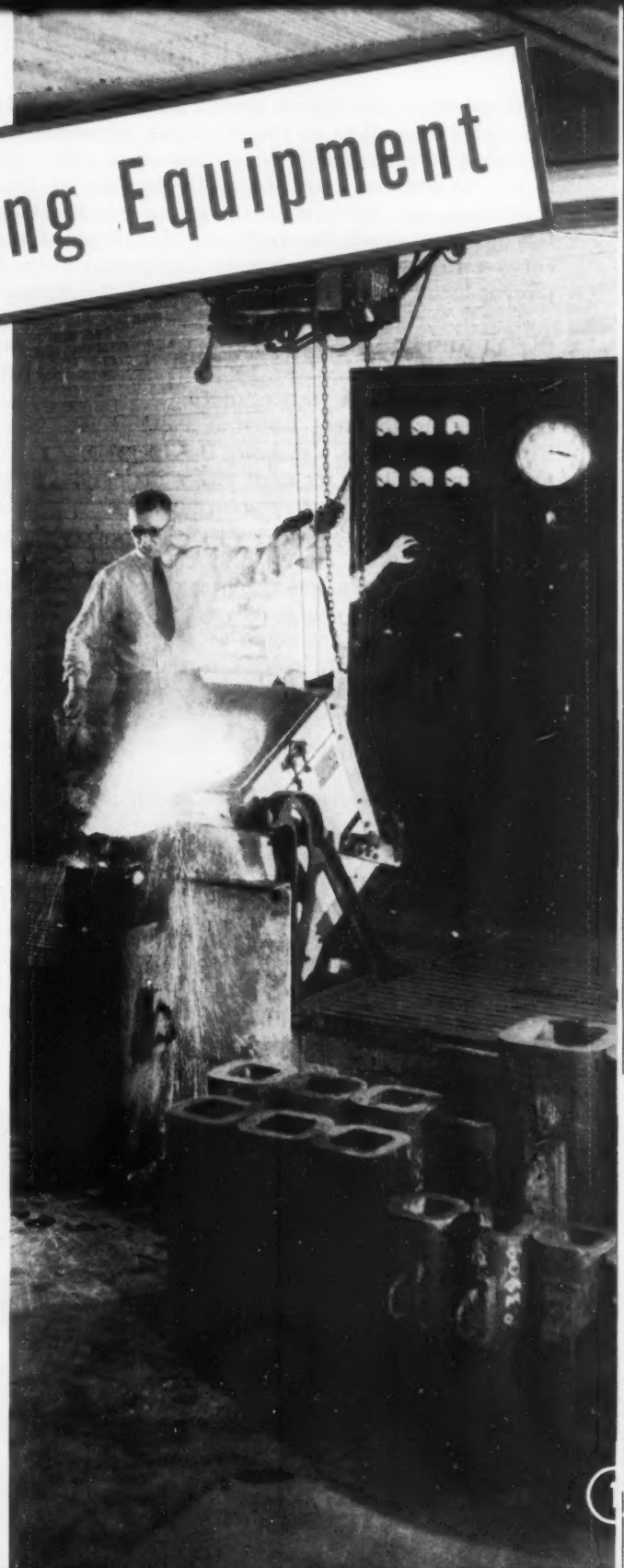
WITH induction heating it is possible to do almost any heating or melting job using any one of the five basic types of equipment now available, if that equipment is big enough. However, the characteristics of these five types of equipment differ widely, and it stands to reason that every specific heating or melting job has its one best equipment. Industry's 30 years of experience with induction heat proves this. Furthermore, it proves that an error in the selection of equipment will usually be quite costly over a period of months or years.

To assist in choosing induction heating equipment, this article presents some hitherto unpublished data together with some well known facts about induction heating—reasons and advantages, important fundamentals, equipment available, charts showing which equipment is best for every application, and finally, some typical applications.

It is now well known that an induction furnace is nothing but a length of conductor carrying a current, usually of high frequency, so conformed and so placed that energy is transferred from it by induction to a second conductor or the furnace charge. It makes no difference whether the conductor is a straight length, a helix, a chunky block, or of some other regular or irregular form, so long as it fits a particular need. The advantage is, of course, that current can be made to flow in a charge, when, where and however necessary to do a job; and energy can be passed through insulation or empty space without the need for visible flames or contacting devices.

Surface Conduction—Surface conduction of high frequency currents, more than any other thing, de-



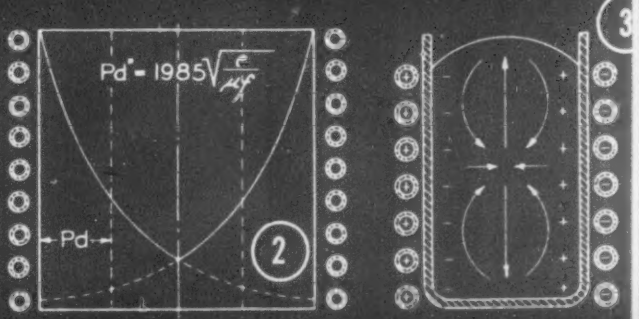


Fig. 1—Steel-melting induction furnace, motor-generator operated

Fig. 2—Graph showing how depth of penetration compares with actual current penetration

Fig. 3—Cross-section of melting furnace showing stirring action

termines when and where certain equipment should be used. Regardless of the frequency, whenever alternating current is induced or flows in a conductor it has its greatest intensity at the surface of that conductor, and the intensity decreases exponentially for distances below the surface. The shape of the curve varies with the resistance and permeability of the conductor and with the frequency of the current.

It is important, therefore, to know what the effective penetration is for each furnace charge so that the most efficient use can be made of the current. The "depth of penetration" formula, according to Steinmetz, is the tool which is most widely used. From it, one obtains a measure for practical use, and figures are available for most materials. Fig. 2 gives the formula and shows graphically how the depth of penetration or "Pd" compares with the actual current penetration.

It is obvious from the graph that for best results the diameter of a charge should be equal to from four to eight times the depth of penetration. If the diameter is small with respect to the depth of penetration the power factor of the charge is reduced and heating becomes inefficient. If the frequency used is higher than is required other handicaps are introduced.

In Table I, the depth of penetration is given for several common materials at from 60 to 1 million cycles; the frequencies shown are approximately those for which equipment is available.

In all induction heating for forging, the heat is generated at the surface of the charge, and the center of the charge is heated by conduction from the hot surface. Since the speed of this conduction is a definite limitation, speed of induction heating of the surface is important.

Rate of Input—It is economical to figure the rate of input so that it does not have to be varied substantially from the beginning to the end of a heating cycle. By having several heaters in a bank the higher absorption of energy by a cold billet is automatically balanced by the lower absorption of energy in a hot billet and the supply system can be operated at substantially constant power.

Where surface hardening is desired, the induced energy is restricted to the surface layers to be heated by selecting a sufficiently high frequency for the power supply. Then the heating energy is applied so fast that the surface becomes heated to the quenching temperature before the interior portion can be heated by conduction. Fig. 6 shows a transverse section of a rolling mill roll which has been heated selectively and hardened by this method. This, of course, is only a single example of the many types of external and internal surface hardening operations made possible by induction heating.

Five distinct sources of current supply are used. Each has its characteristics and each has its most useful field of application. While the fields overlap considerably, the equipments are far from interchangeable and no one source of supply can even remotely cover all applications.

Commercial Power Lines—Commercial power lines supply a frequency of 25, 50 or 60 cycles, depending upon the locality. These are the lowest frequencies commonly used in induction heating applications and are used for low temperature work such as annealing, stress relieving, chemical vat heating and the like. For many of the applications, hysteresis heating as well as induction heating is utilized. Power supply can be said to be unlimited.

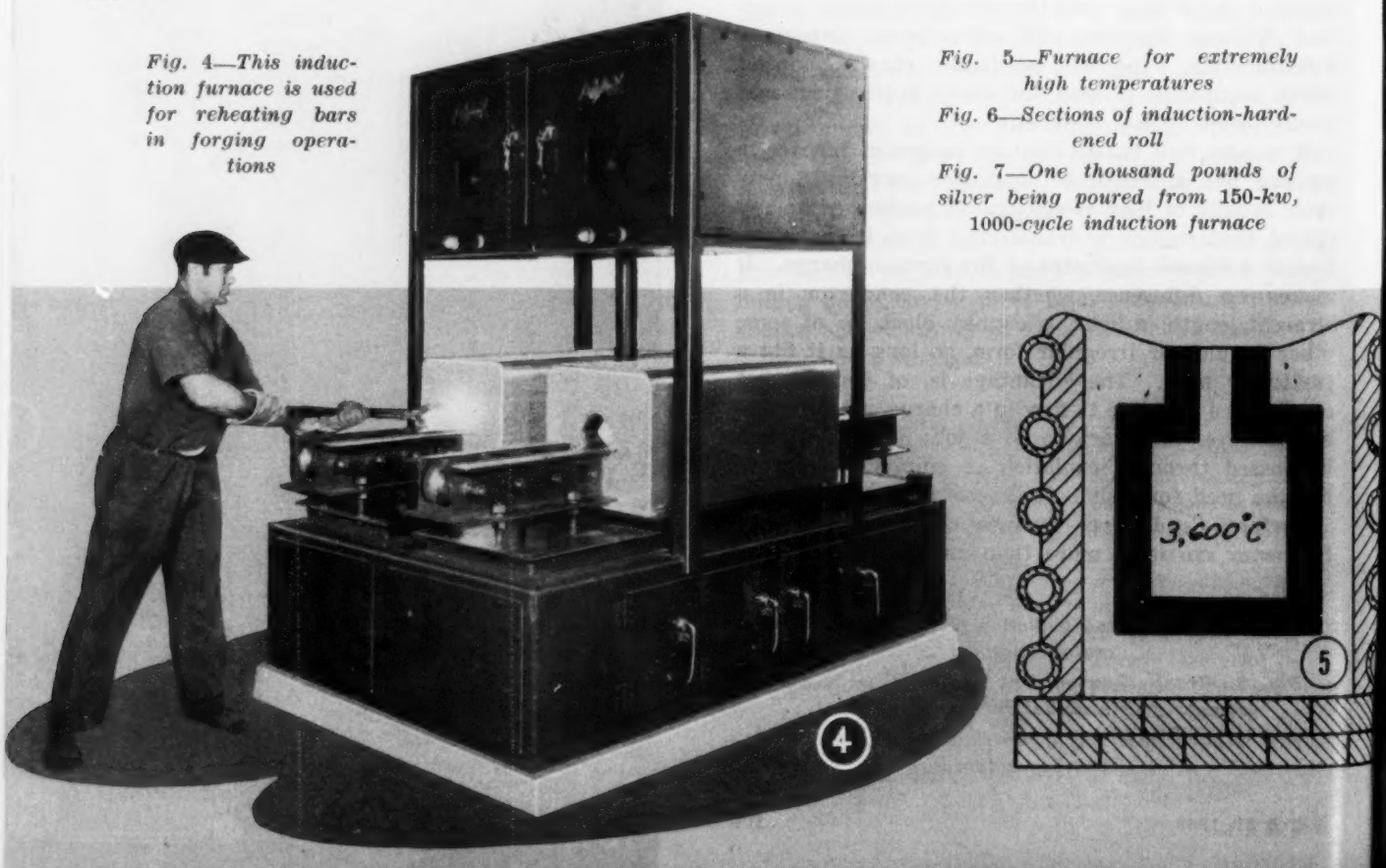
These frequencies can be used for steel melting or

Fig. 4—This induction furnace is used for reheating bars in forging operations

Fig. 5—Furnace for extremely high temperatures

Fig. 6—Sections of induction-hardened roll

Fig. 7—One thousand pounds of silver being poured from 150-kw, 1000-cycle induction furnace



heating steel for forging but in the melting furnaces so much current must be used that the excessive electromagnetic turbulence or stirring of the molten bath makes it undesirable. In addition, capacitors for power factor correction become very expensive. For forging applications, the first cost of line frequency equipment and engineering is very high and the equipment cannot readily be adapted for different applications.

Motor Generators—By far the greatest source of induction heating power is the motor generator. Almost all of the large production jobs are powered with motor generators. Frequencies are fairly well standardized at around 1000, 3000 and 10,000 cycles, and generators are available in sizes from 20 to 1250 kilowatts and up. For larger blocks of power, units can be paralleled. Motor-generator equipment is used for melting, heating for forging, heating for surface and through-hardening, and for a large number of other applications. For large or bulky jobs the lower frequencies are used, but for smaller jobs, and especially for thin surface hardening jobs, the higher frequencies are more useful.

Figuring all losses—motor and generator, furnace coil, leads and switches, losses due to radiation and conduction from the molten metal, etc.—the overall efficiency in a well-designed generator-operated induction melting furnace should be about 50 per cent. That is, about 50 per cent of the power drawn from the power lines shows up as actual heat content in the molten metal.

In heating steel for hot forming and forging operations, the overall efficiency figure on the same basis as above, should approximate 60 per cent. In some heating applications, the efficiency will be very much greater, for instance, in heating magnetic metals to low temperatures, as for chemical work. In other heating applications, especially where large amounts of power must be concentrated in small work areas as for surface hardening, or where the charge is small or irregular, the efficiency may be very low as compared with the average. In general thinking and for average forging jobs an overall figure which is good to remember is that it will take 0.2 kwh per pound to raise steel charges from room temperatures to forging temperatures around 2200° F.

Generators offer, by a considerable margin, the cheapest source for high-frequency power. Prices today range from $110.00 to $250.00 per kilowatt of capacity, including controls, switches, furnaces, capacitors etc., but not installed. The higher cost per kilowatt is, of course, for the smaller sized equipment.

Mercury Arc Rectifier Type Converters—Another type of equipment which has been known for quite a long time but which has only comparatively recently been tried out commercially, is the pool cathode mercury arc rectifier type converter. Although not fully established as a competitor of the motor generator, a number of heating and melting installations have been made. These units operate at from 800 to 1500 cycles usually, but may have a slightly wider range. In cost, they are said to compare with motor generator equipment (in sizes from about 300 kw up) although it is doubtful if sufficient is known to establish this definitely. Studies are in progress to

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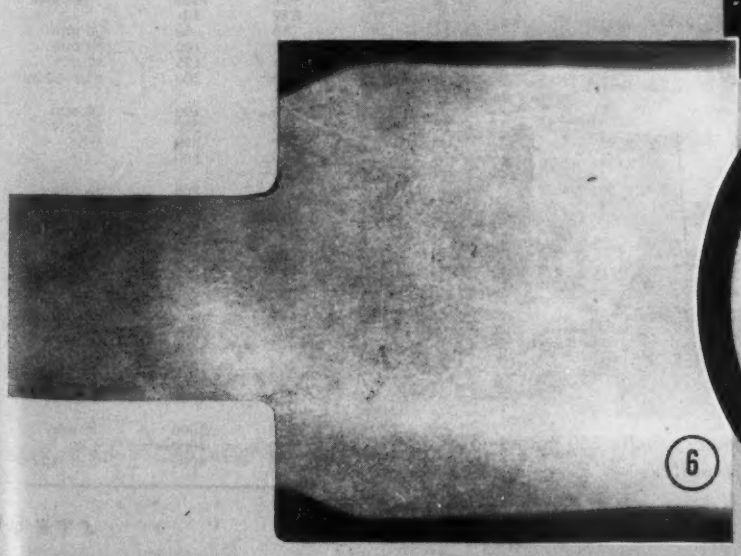

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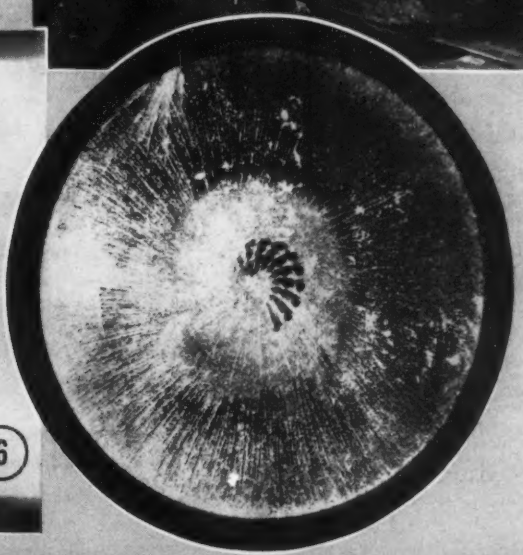

determine whether they have any real advantage over other types of equipment.

Spark Gap Converters—Spark gap converters comprise the next type of equipment and the next higher ranges in frequency. They were the first type of equipment to be used seriously for high frequency heating applications. Falling into two different classifications, the mercury-hydrogen spark gap converters operate at from 10 to 80 kilocycles frequency while the quenched gap converter units usually operate at from 100 to 500 kilocycles frequency. These units are limited in power and are made with input ratings of from 3 to 40 kw. Because of their wide field of application, it is difficult to give them effective output ratings.

Both types of equipment are used for laboratory and small scale heating, melting and brazing applications. Those of the mercury-hydrogen type are much better for average melting jobs while those of the quenched gap type are better for most brazing jobs. Reason for this is that the electromagnetic circulation or stirring effect, so desirable in melting applications, is more prominent at the lower frequencies. In brazing operations, the irregular characteristic of the mercury-hydrogen type spark gap is detrimental in some instances, and the more regular characteristic of the quenched spark gap allows the melted joining metal to lie more quietly in place. For melting applications, however, the higher frequencies inject more problems regarding refractories, electrical breakdown and induced static arcing effects.

Costs of spark gap equipments range from about $150.00 to $300.00 per input kilowatt for those of the mercury-hydrogen gap type and from $200.00 to $400.00 per input kilowatt for those of the quenched gap type, the higher costs again being for the smaller powered units.

Spark gap units usually are sold as complete equipment and require little installation cost as compared with the motor generator and inverted-rectifier types of equipment. Both units are flexible, but the mercury-hydrogen gap type is by far the simplest since tuning of the furnace coil is inherently automatic and any furnace from a dead short to the largest size may be operated by merely connecting it to the converter terminals.

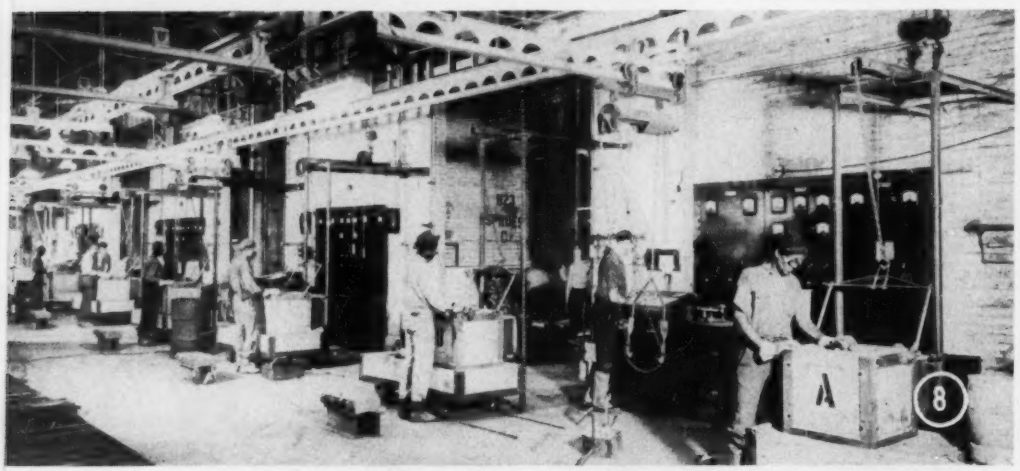

Fig. 8—Each of these eight induction furnaces melts 200 pounds of high-tin bronze in 22 minutes

Vacuum Tube Converters — Highest frequencies used for induction heating applications are supplied by vacuum tube or radio frequency generators. Frequencies range from about 200 kilocycles to many megacycles, but as a rule, the lower frequencies are more widely used for induction heating and the higher frequencies are more generally used for dielectric heating. Vacuum tube equipment is built in sizes from a fraction of a kilowatt to 100 kw and up and cost from about $750.00 to $450.00 per kilowatt. These units find their greatest usefulness for heating thin section or small diameter charges for forging or hardening operations, for effecting shallow depth surface hardening, for brazing, and for similar jobs.

Equipment Selection—This information has been summarized into an equipment selection chart which is reproduced here as Table IV. Designed as a quick guide, it was prepared by the author from engineering data collected since the first applications of high frequency heating in 1916. While believed to be as accurate as possible, it should be pointed out that almost any equipment, if it has sufficient power, can be used in some manner for almost any application listed.

Letter A designates the type of equipment deemed best for the particular application with all factors—economic as well as technical—considered. Grades B and C denote the next best. Where no letter is indicated, the equipment is not recommended for the job.

For applications marked with an asterick (*), which vary widely with respect to size, shape and temperatures involved, the recommendations cannot be specific and the ratings are for average applications on which data are available. Generally speaking, the

TABLE I
DEPTH OF PENETRATION IN INCHES FOR VARIOUS MATERIALS

Material	Frequency-Cycles 60	1,000	10,000	100,000	1,000,000
Graphite	10.1	2.5	0.78	0.25	0.08
Iron (Molten)	4.3	1.1	0.33	0.11	0.03
Copper (Molten)	1.4	.35	0.11	0.03	0.011
Copper	0.42	0.10	0.03	0.01	0.003
Steel	0.04	0.01	0.004	0.001	0.000

TABLE II
STEEL MELTING PERFORMANCE AS A FUNCTION OF FURNACE AND GENERATOR SIZE

Generator Size KW	Furnace Size Lb	Approx. Time to Melt
50	50	25 min
50	100	50 min
50	150	75 min
50	200	1 hr–50 min
100	100	20 min
100	200	35 min
100	300	1 hr
100	500	2 hr
175	300	35 min
175	600	1 hr–15 min
175	1000	2 hr–15 min
250	600	50 min
250	1000	1 hr–20 min
350	600	35 min
350	1000	1 hr
350	2000	2 hr–15 min
700	1000	30 min
700	2000	1 hr
700	4000	2 hr–15 min
1250	2000	30 min
1250	4000	1 hr
1250	8000	2 hr–15 min

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equipment shown in the left hand columns is best for large pieces, while equipment in columns at right is more suitable for small pieces and thin sections.

Typical Applications—Typical cross section of a high frequency melting furnace with its inherent electromagnetic circulation or stirring effect, is shown in Fig. 3. This mixing effect is one of the most desirable features of induction melting and is used advantageously in nearly all induction melting furnaces, from the smallest to the largest. Most characteristic at the lower frequencies in the generator and lower frequency converter ranges, its advantages die off rapidly at frequencies above 50 kc.

Large motor-generator-operated furnaces operating at 960 cycles and melting steel with a power consumption of about 600 kwh per ton are shown in Fig. 1. They are made in sizes to 10 tons capacity.

Fig. 8 shows eight furnaces, powered at 100 kw and 3000 cycles. Each furnace melts 200 pound charges of high tin bronze in about 22 minutes. Furnaces lift away from free standing crucibles which are then picked up with shanks for pouring.

Fig. 7 shows 1000-pound charge of sterling silver being poured from a furnace powered at 150 kw and 1000 cycles.

Tables II and III were prepared for a wide range of furnaces, showing time required to melt red brass and steel when powered with various sized generators. Table III is keyed to show proportionate rates of melting for other nonferrous and precious metals.

Induction furnace adapted to melt and pour in a vacuum or controlled atmosphere is shown in Fig. 9. Vacuum melting is finding many uses in research and production. Many of these units are adapted with a swinging mold which remains stationary in vacuum chamber while assembly is tilted for pouring.

Four-inch rounded square bars, 30 inches long, are fed into the furnaces, Fig. 4, for a reheating cycle. Furnaces are powered at 125 kw, 960 cycles and are used to reheat a billet which has cooled somewhat during a preliminary forging operation.

For the highest temperatures, graphite crucibles or muffles usually are used as energy absorbers. Temperatures up to 6500° F, or the vaporization point of the graphite muffle, have been reached and many industrial applications, although usually at lower temperatures, are being worked, Fig. 5.

Fig. 9—Vacuum furnace

TABLE III

RED BRASS MELTING PERFORMANCE AS A FUNCTION OF FURNACE AND GENERATOR SIZE

Generator Size KW	Furnace Size Lb	Approx. Time to melt; min
50	*120–300	27–70
50	100	20
50	200	40
50	300	65
50	450	100
100	*150–300	†20–35
100	200	20
100	300	32
100	450	45
100	600	60
100	1000	110
175	*300	†20
175	450	25
175	600	33
175	1000	60
250	*300	†20
250	450	†20
250	600	23
250	1000	40

* Lift coil furnaces.
† Reduced power.
Note: For other metals divide the time to melt by the following figures:

Copper	0.90
Yellow brass	1.20
Aluminum	0.50
Magnesium	0.55
Gold	2.60
Silver	1.50

TABLE IV

INDUCTION HEATING & MELTING EQUIPMENT SELECTOR

Applications A=Recommended B=Good C=Some merit —=Not recommended	Power Lines Unlimited 25-60 Cycles	Motor Generators (Some Rectifier Converters below 3000 Cycles) 20-1200 Kw (up) 1000 Cycles	3000 Cycles	10,000 Cycles	Spark Gap Converters Mercury-Hydrogen 3-40 Kw 20-80 Kc	Quenched 3-30 Kw 100-500 Kc	Vacuum Tube Converters 5-100 Kw (up) 0.5-1.5 Mc	1.5 Mc (up)
Melting (inc. vacuum and pressure)								
Charges—30 lb and under	—	—	B	A	A	B	—	—
30-300 lb	—	B	A	B	B	—	—	—
300 lb—4 tons and up	—	A	B	—	—	—	—	—
Forging, upsetting, etc.								
Pieces to ½ in. diam.	—	—	—	B	A	A	A	C
½ in. to 2 in. diam.	—	—	A	A	B	B	B	C
2 in. to 4 in. diam.	—	A	B	C	C	—	—	—
4 in. diam and over	—	A	C	—	—	—	—	—
Hardening—Very thin case	—	—	—	—	—	—	A	A
Hardening—Average case								
Pieces to 1 in. diam.	—	—	C	A	A	A	A	A
1 in. to 2 in. diam.	—	—	B	A	C	B	B	—
2 in. diam and over	—	B	A	A	—	—	—	—
Hardening—Deep case								
2 in. to 4 in. diam.	—	A	A	B	B	C	—	—
4 in. diam and over	—	A	B	C	—	—	—	—
Hardening—Through								
Sheet, thin wall tubes	—	—	—	B	A	A	A	B
Pieces to ½ in. diam.	—	—	—	B	A	A	A	B
½ in. to 2 in. diam.	—	—	A	A	B	B	B	—
2 in. diam and over	—	A	A	B	—	—	—	—
Brazing, soldering, welding								
Small, irregular parts	—	—	—	B	B	A	A	B
Large, regular parts	—	A	A	A	—	—	—	—
Sintering—Carbides	—	A	A	A	A	C	C	—
High temperatures (graphite, etc.)	—	A	A	A	A	C	C	—
Vat and autoclave heating	A	B	B	C	C	C	—	—
Degassing vacuum tubes	—	—	—	—	B	A	A	—
Dielectric heating	—	—	—	—	—	—	—	A
Sheet heating	—	—	—	B	B	B	A	—
Shrink heating*	A	B	B	B	B	B	B	—
Annealing-stress relieving*	A	B	B	B	B	B	B	—
Baking and drying finishes*	A	B	B	B	B	B	B	—
Die heating*	A	B	B	B	B	B	B	—
Muffle heating (nonconductors)*	B	B	B	B	B	B	B	—

* Applications vary so widely, recommendations cannot be made specific for those marked with asterisk.

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R. B. DOUGLAS
President

Tool Engineers STUDY INDUSTRIAL ACTIVITIES in Pittsburgh

H. L. TIGGES
First Vice President

Canadian engineer is elected president of ASTE at 17th annual meeting, which attracts 1000 members to "Steel Capital of the World"

FOR the first time in its history, one of the Canadian members of American Society of Tool Engineers has been elected to its presidency. At the annual dinner of the society, Saturday evening, March 12, 1949, Robert B. Douglas, who is president of Godscroft Industries Limited, Montreal, manufacturer of light motorcycles, took over the tungsten carbide gavel from Irwin F. Holland, general superintendent, small tool and gage department, Pratt & Whitney, division Niles-Bement-Pond Co., West Hartford, Conn.

This is a deserved tribute to the constructive activities of the several chapters of ASTE in Canada, and to the constantly developing industrial activity north of our border. Incidentally, the fall meeting of the society will be held in Montreal. The theme of that meeting will be tool engineering as applied to small and medium production quantities. This is a vital subject in Canada and is of growing importance here in the United States as well.

The meeting in Pittsburgh, which ran through from early Thursday morning, March 10, until late Saturday night, was built around the industries peculiar to the Pittsburgh area. Through the inspection trips as well as through the technical sessions, the 1000 out-of-town visitors got first-hand insight as to how tool engineering is involved in production and fabrication of steel and steel products—including valves and fittings, heavy forgings and gears; carbide tool materials and carbide tools; electrical products; railway equipment; aluminum and aluminum products; bronze; glass; and paints.

In some cases the tool engineering was that involved in the production and processing of the materials—as for example the tooling up of big upset forging machines, turning and grinding of rolls and pressworking of aluminum. In other cases it was the impact of the materials themselves on the tools themselves—as for example new uses for carbides in dies, etc.; glass in machine design; and color for visibility and identification on machine tools, jigs and fixtures.

Much broader conception of the possibilities of many familiar machines were given by several of the papers. For example, William W. Criley, vice president and general manager, Ajax Mfg. Co., Cleveland, in his paper, "Design of Dies for Upsetting Forging Machines", demonstrated that these machines today have developed far beyond simple "bolt heading". Through cleverly designed multiple dies they can be made to handle long forgings of multiple diameter, fork-shaped parts and bent shapes. Improvements in gripping methods and in extremely big machines open up entirely new fields of usefulness in the automotive and related industries.

In a session on handling corrosion-resisting steels addressed by Forest F. Versaw, shop superintendent, Gulf Research & Development Co., Harmarville, Pa.; George A. Roberts, chief metallurgist, Vanadium Alloys Steel Co., Latrobe, Pa.; and Malcolm F. Judkins, chief engineer, Carbide Division, Firth-Sterling Steel & Carbide Corp., McKeesport, Pa., emphasis was placed on the advantages and growing use of these steels as constructional materials in industry. With developments in carbide cutting materials, better understanding of what happens when metal is cut and formed and suitable cutting fluids, the bug-a-boos involved in machining stainless rapidly are being eliminated. This session served as a good example of how metal producers, tool engineers and the oil industry engineers are co-operating on problems common to all.

Under the chairmanship of Gardner Young, tool supervisor, Westinghouse Electric Corp., East Pittsburgh, a similar round-up was held on aluminum fabrication. E. G. Kort, jobbing division, Aluminum Co. of America, New Kensington, Pa., dealt with drawing and spinning that metal—with emphasis on the difference in behavior between that metal and steel. He demonstrated how in forming beer kegs, aluminum first must be roughly positioned before the final forming. It cannot be "pulled" as steel is. Also he described some work on large dished heads which are shaped first by spinning, then completed by local punching and flanging.

In describing the tests run on the

(*Please Turn to Page* 124)

Tests Ceramic Taphole Segment Against

BLAST FURNACE BREAKOUTS

Blast furnace operators seek clue concerning recent hearth failures around iron notch. Pressurized furnace operation decreases lost time. Cleaning of coal for coking is problem facing coal operators. New coal blending procedure appears promising. Reports on Labrador iron ore deposits

HIGH pressure operation of blast furnaces and carbon hearth and taphole failures were two topics commanding top attention at the regular meeting of the Blast Furnace and Coke Association of the Chicago District, Mar. 4, at the Del Prado Hotel, Chicago. More than 200 attended the various sessions.

Present status of high-pressure operation of blast furnaces was reviewed briefly by B. S. Old, Arthur D. Little Inc., Cambridge, Mass. Most of his presentation consisted of background information to set the stage for later speakers. Republic Steel Corp., he stated, is operating about five furnaces on high top pressure basis, these stacks being located at Youngstown, Cleveland, Buffalo and Chicago. Top pressures range from 6 to 13¼ pounds, but mostly between 10 and 12 pounds.

Higher Iron Yield—Among advantages derived from high top pressure, Mr. Old enumerated smoother furnace operation because of lower pressure drop, less flue dust production, lower coke consumption and higher iron yield. Republic is not too proud of its overall results so far, the speaker commented, however, records show that the stacks have less lost time than nonpressurized units. Mr. Old hinted that among future developments may be improved blowing equipment.

Frank H. Janecek, blast furnace engineer, Republic Steel Corp., Cleveland, spoke upon mechanical features of furnaces operating on high top pressures but confined his attention principally to the method of sealing the large bell to maintain pressure. Originally, the seat was provided by two rings resting on a hard-surfaced band 12 inches wide. An attempt was made to narrow this band, but following a failure on a Cleveland furnace, the band will be made 15 inches wide.

Discussing high top pressure from the operation angle, H. F. Dobscha, assistant district manager, Cleveland District, Republic Steel Corp., said that two additional stacks at Youngstown will be pressurized in the near future, one of 26, the other of 24-foot. The Canton furnace is now operating on a modified, rather than a full top pressure.

Three recent failures, chiefly breakouts around the taphole, encountered with carbon-lined blast furnaces prompted the symposium in which the participants were: V. J. Nolan, assistant general sales manager, National Carbon Co. Inc., New York; G. O. O'Hara, sales manager, Great Lakes Carbon Co., Niagara Falls, N. Y.; Mr. Dobscha; and W. W. Durfee, superintendent of blast furnaces, National Tube Co., Lorain, O.

Under extreme time pressure, Mr. Nolan abstracted the paper he had presented at the meeting of the Eastern States Blast Furnace and Coke Oven Association in Pittsburgh, Feb. 11. This paper was reviewed at considerable length in STEEL, Feb. 21, page 111.

Breakout Still Under Study—Mr. O'Hara confined his remarks to one breakout which had occurred after the furnace had been in operation 58 days. The stack had a thin-wall carbon lining, and the breakout resulted from erosion at the taphole cut into a solid carbon block. In the breakout, hot metal in the furnace had eroded the refractory brick backing up the carbon lining and had almost encompassed the circumference of the stack. Cause of the failure is still under study.

The breakout in the Buffalo furnace was described by Mr. Dobscha. The failure occurred on a level with the iron notch and extended to 2 feet below, and obviously was a result of carbon disintegration. The furnace, which had produced 750,000 tons of iron prior to the breakout, was repaired and has made 70,000 tons.

Use of the solid carbon iron notch was initiated in the United States and the only known failures have occurred here, thus American carbon manufacturers and blast furnace operators have the problem of tracking down the causes of failure. Moisture has been suspected, but there is little evidence this is so. European practice has been to line carbon tapholes with ceramic segments and in this connection Mr. Dobscha stated that in a Youngstown furnace his company is installing a ceramic area around the hole inside the furnace. Results to be obtained in this furnace may provide by elimination some clue as to carbon failures. Mr. Dobscha also commented that blast furnace engineers should not overlook the possibility that careless use of the oxygen lance may be a contributing factor in failures occuring around carbon tapholes.

Test Makes Good Guide—That deposition of carbon on ceramic brick used in blast furnace linings, resulting from the disintegration of CO, causes brick failures, is well known to blast furnace operators. To obtain a measure of the ability of brick to withstand this deterioration, Carnegie-Illinois Steel Corp. developed a 120-hour test from work starting in 1920. A shorter test was sought and in 1942 one requiring only 40 hours was devised. This test has worked well. A description of the test apparatus and procedure was described by J. A. Shea of the corporation's works at Gary, Ind. The speaker asserted that hard burned brick stand up well in the test and in service. The test, therefore, serves as a most useful guide in predetermining serviceability of lining brick. However, he said, it may be desirable to modify the test to get an even better guide.

In commenting on this paper, Harry A. Strain, director of raw materials, fuel and power, Carnegie-Illinois Steel Corp., Pittsburgh, asserted that we have not yet arrived at a point where it is possible to say what is acceptable brick and what is not; in other words, blast furnace engineers are not ready to write specifications for brickmakers.

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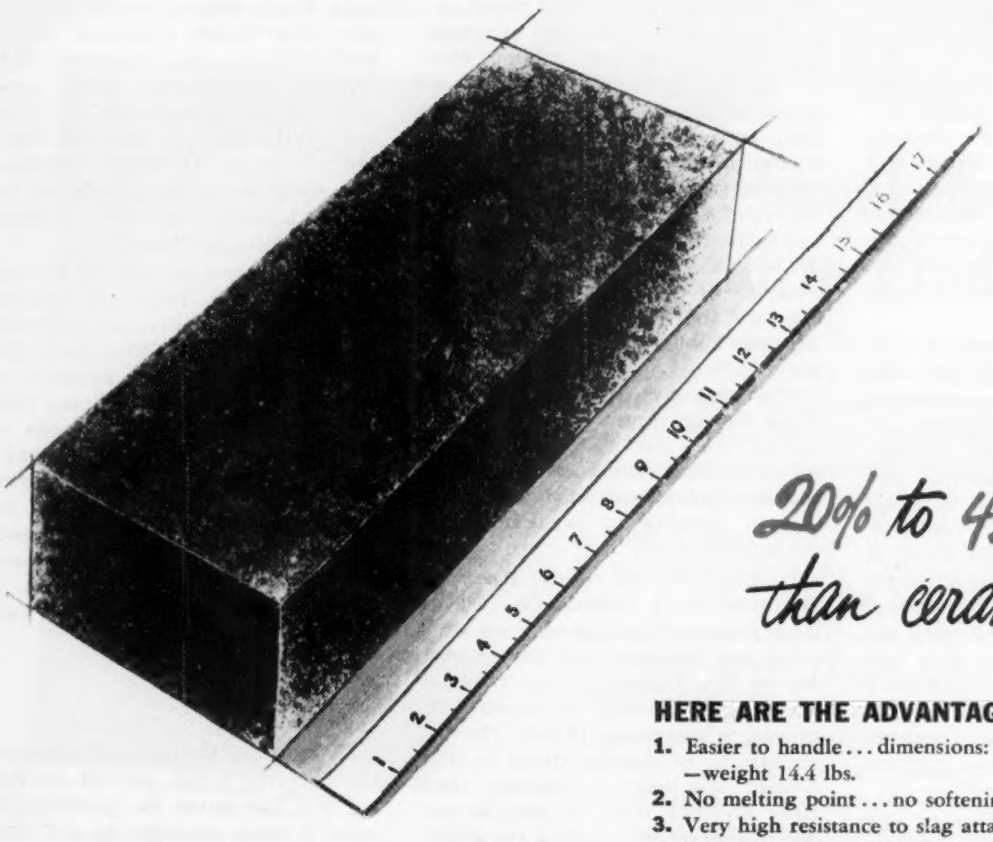

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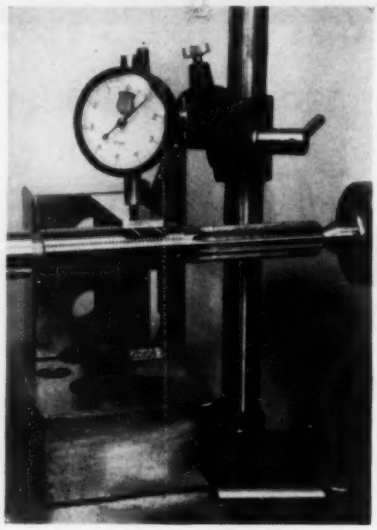


QUICK CHECK: Designed by E. P. McKitrick, chief engineer of Cross Co., Detroit, is this gaging setup for checking pitch diameter runout of threaded shafts quickly and accurately without special equipment. As spindle is revolved, the wires follow the lead of the thread and hold their longitudinal position against the planer gage face. When taking an indicator reading, best results are obtained by reversing spindle rotation a slight amount every third of a turn, this drawing threaded wires away from the planer gage and permitting them to nest in the thread without interference

facturing" was subject of a paper prepared by N. L. Davis, Nelson L. Davis Co., engineers, Chicago, and abstracted for him in his absence. Theme of the contribution was that mechanization of coal mining has complicated cleaning, and unless the steel industry can solve the cleaning problem in its captive mines it will have to look to other sources for its coking coal. In the laboratory, cleaning procedure using heavy liquids has given good results, but this procedure is not feasible in large-scale mining practice.

New Blending Approach—A new approach to blending practice, with emphasis on coal, was contributed by John F. Meissner, consulting engineer, materials handling, Chicago. To get a constantly uniform raw material, it is necessary to adopt means beyond the presently-used mixing bins, he contended. The latter, in his opinion, usually function merely as supply receptacles. The speaker described a new type of blending bed which is totally enclosed in a concrete structure, to serve both as a container and as protection against weather. Furthermore, the closed bed will occupy one-half the area required by an open bed.

Efficiency of the new blending procedure is obtained partly by the manner in which the coal is piled and partly by the manner in which it is removed. Piling is by means of an overhead distributing conveyor and automatic tripper. Removal of coal is by means of a mechanical rake and tunnel conveyor. In operation, two blending beds would be required—while coal is being stored in one, coal for consumption is being removed from the other.

In discussion, E. J. Gardner, superintendent, coke plant and blast furnaces, Inland Steel Co., Indiana Harbor, Ind., gave the opinion that blending beds such as described would require a tremendous amount of space, and pointed out that mixing bins are not as inefficient in regard to blending as might be supposed. A good degree of blending takes place in the bins and in addition some blending has already been done at the mines. However, Mr. Gardner emphasized that improved blending is desirable. Much work is being done on the problem as result of the poor coal which the steel industry was obliged to utilize during the war.

The discussion of Mr. Meissner's paper having veered around to quality of coal for cokemaking, Mr. Strain ventured the observation that the day has passed when classification in blending of ore can carry the defects in coal.

Looking into the future, Perry G. Harrison, M. A. Hanna Co., Cleveland, reviewed the Labrador ore situation and prospects for use of this ore in the United States. The ore body, only partially surveyed and proved, is staggering in size. The ore appears to be slightly higher in iron content and lower in moisture than Lake Superior ores. To get the ore out to market will require the building of extensive railroad and dock facilities at great expenditures. Nevertheless, Mr. Harrison believes Labrador ore can be marketed competitively with Lake Superior ore and that it some day will constitute an important raw material source for American blast furnaces.

Blast Furnace and Coke Association of the Chicago District and Eastern States Blast Furnace and Coke Oven Association will hold their next joint meeting at the Book-Cadillac Hotel, Detroit, Oct. 21. An inspection of Ford Motor Co. will precede the meeting on Oct. 20.

Materials Handling Conference Held at Purdue

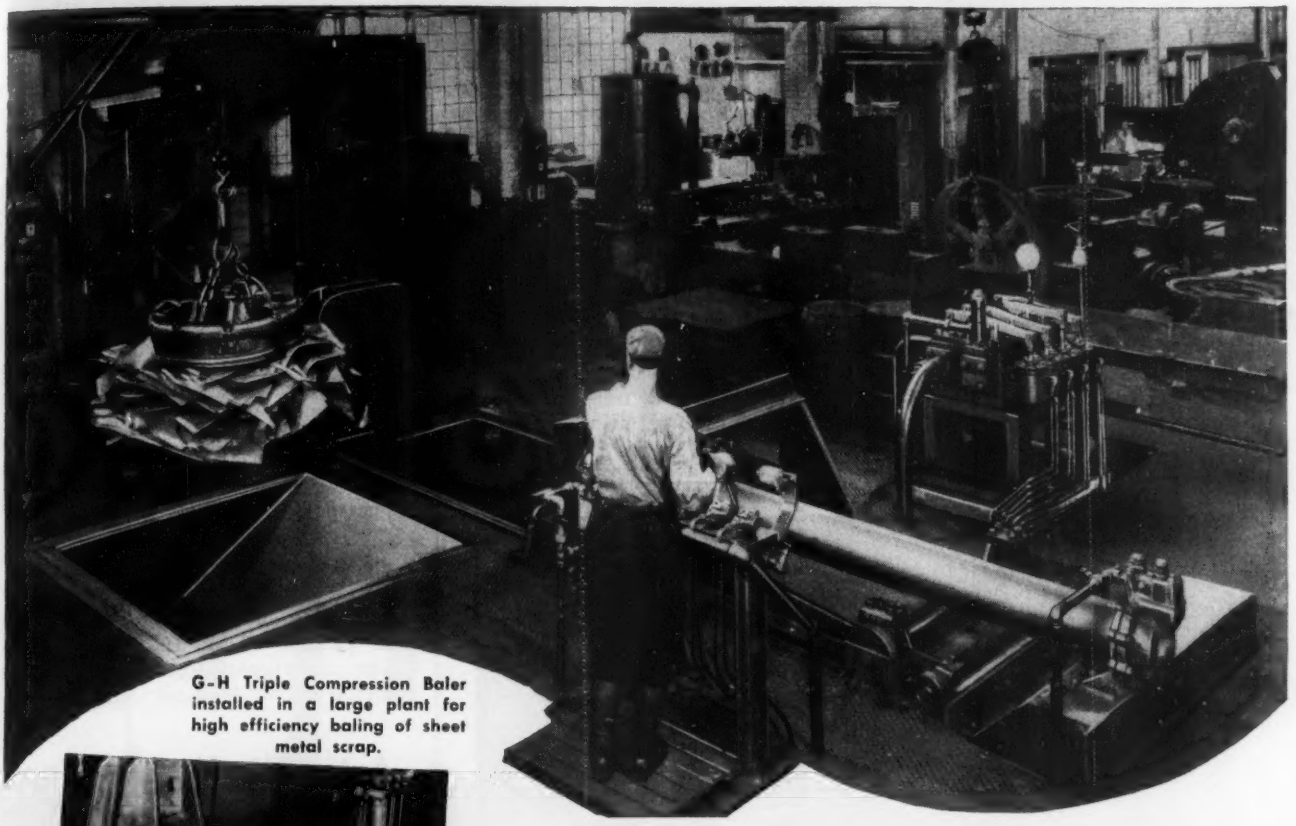
Jointly sponsored by department of general engineering and the Technical Extension Division of Purdue University in co-operation with the Indiana and Midwest materials handling societies and the Material Handling Institute, a materials handling conference held at the university recently attracted 100 men from 11 different states. Said to be the first conference on the subject held at a university, it presented several addresses at four technical sessions.

Program was as follows: Keynote address, "Management Looks at Material Handling," was presented by Lloyd Backart of the institute's board of directors and the Caster and Floor Truck Manufacturers' Association. Bob Brady, supervisor of industrial engineering, Ingersoll Steel Division, Borg-Warner Corp., used slides in his presentation of "Production Problems of Materials Handling." Dr. L. M. Sears, professor of history at Purdue, spoke at the dinner meeting, his subject being "Can We Win the Peace?"

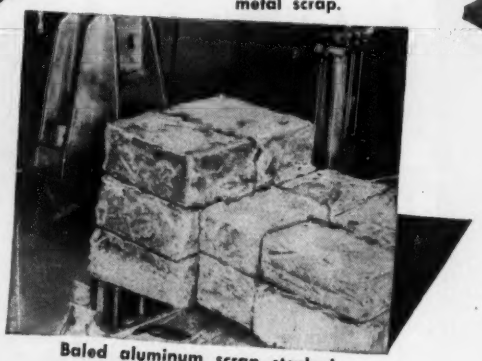
On the second day, W. W. Phillips, manager of raw materials handling of Eli Lilly & Co., gave an illustrated talk on "Space Utilization and Control." E. H. Ashley, manager of package development, Shipping Division, General Electric Co., spoke on "Packaging and Materials Handling," also using before and after motion pictures. Types of forms used for advantageously making plant layouts were shown by R. W. Mallick, consultant and plant layout expert, in his illustrated talk on "Plant Layout and Materials Handling."

—o—

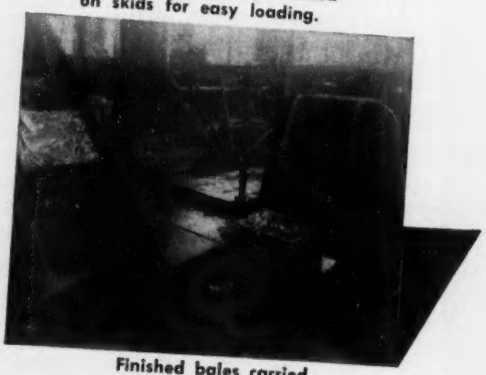
System for tabulating piece-work that greatly speeds payroll computing and eliminates the possibility of error is being produced by E-Z Code Division of Western Lithograph Co., Los Angeles. At the start of each job a small code card is given to the operator, to which are attached number markers corresponding to the number of operations for the job. Upon completion, the worker removes his designated self-adhesive marker from its backing card and applies it over one of the numbers on his job sheet. The card remains with the job and the same procedure is followed at all subsequent stations.



G-H Triple Compression Baler installed in a large plant for high efficiency baling of sheet metal scrap.



Baled aluminum scrap stacked on skids for easy loading.



Finished bales carried to cars by conveyor.

Baled Sheet Metal Scrap is Vital to Production . . .

A steady, adequate flow of properly prepared scrap metal, both ferrous and non-ferrous, to the mills, smelters and foundries is highly essential to meet the increasing demand for new metal and castings. Today it is indispensable in maintaining high-level industrial production.

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Tool Engineers

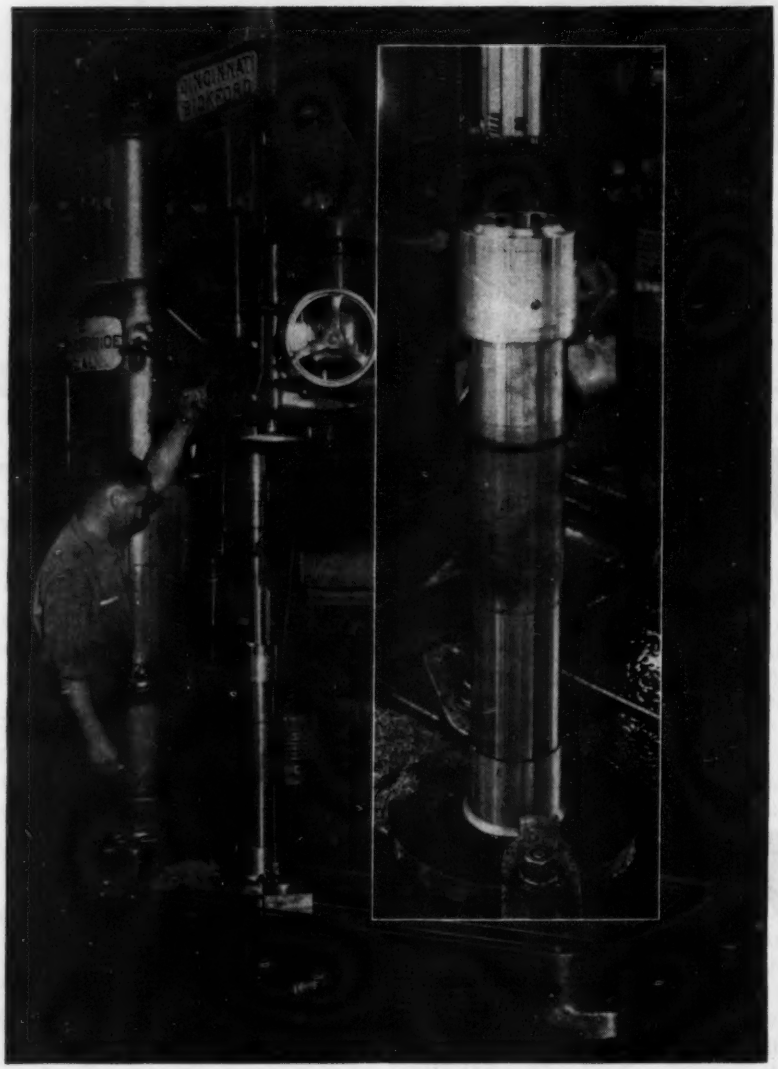
(*Concluded from Page* 119)

experimental lathe at Aluminum Research Laboratories at New Kensington, E. S. Howarth, chief of the metalworking division of the laboratories, stated that there seems to be no limit to the speed at which aluminum can be machined. The only limit now is that set by speeds of existing machine tools and ability to dispose of the chips. It appears that ultra-speed machine tools for aluminum are in the offing.

Guest speaker at the annual dinner of the society was Latham E. Osborne, senior operating vice president, Westinghouse Electric Corp., East Pittsburgh. Under the title, "Tools—Key to Abundance", Mr. Osborne stressed the point that while workers generally realize that machines and tools do not destroy jobs, the government does not yet realize that taxation which discourages retooling is holding back our industrial development and is tending to make industry static rather than dynamic. If assurance were given that taxation of industrial equipment and facilities would be corrected to fit the economics of the times, many projects now being held in abeyance would be put into effect, he indicated.

In addition to President Douglas, other new officers introduced at the annual dinner were: First vice president, Herbert L. Tigges, who is executive vice president of Baker Bros. Inc., Toledo, O.; second vice president, Jacob J. Demuth, who is general superintendent of Sligo Inc., St. Louis; third vice president, Prof. Halsey F. Owen, department of industrial engineering, Purdue University, Lafayette, Ind.; treasurer, George A. Goodwin, who is chief process engineer, Master Electric Co., Dayton, O.; and secretary, W. B. McClellan, engineer, Gairing Tool Co., Detroit. Harry F. Conrad continues as executive secretary with headquarters at Detroit.

New directors are Roger F. Waindle, Arthur D. Lewis, Leslie B. Bellamy, Robert W. Ford, Thomas J. Donovan Jr., Jacob J. Demuth, Harold E. Collins, Victor H. Ericson, Herbert L. Tigges, Robert B. Douglas and Irwin W. Holland.



UNUSUAL KEYWAY SETUP—Job performed by this radial drill currently in operation in the plant of Hyde Windlass Co., Bath, Me., consists of cutting ten ½-inch splines 5 inches long to a depth of 0.3325-inch. The machine, supplied by Cincinnati Bickford Tool Co., Cincinnati, holds tolerance to within an accuracy of 0.003-inch. Closeup of the work piece being processed, which measures 5 inches in diameter and 3 feet long, can be seen at the right. A small milling cutter driven by a worm within the stem held in the machine head, cuts the keyway as the stem is fed down through the work—the stem being indexed to provide for the multiple keyways

Automatic Machine Taps Four Split Sleeves

Production of 480 pieces per hour at 100 per cent efficiency, allowing 28 seconds for loading, is claimed for a two-way 8-spindle horizontal lead screw tapping machine built by LeMaire Tool & Mfg. Co., Dearborn, Mich. Consisting of fabricated center base supporting a three-station trunnion, two cast iron end bases each supporting a No. 150 lead screw tapping unit which in turn carries a 4-spindle tapping head, the machine taps four split sleeves at each cycle with automatic unloading of parts.

At each of three trunnion stations a double holding fixture is mounted, each holding two split sleeves. A sliding guide holds the parts in place until they reach the second station where they are hydraulically clamped, then tapped and unclamped. At the third station, they drop into a finished part chute. Operation of the cycle is automatic after parts are loaded and cycle button is pressed. Coolant is provided to all taps.

—o—

Air or gas at pressures up to 150 pounds per square inch are delivered from the model 0-10S compressor, powered by a multifuel engine and announced by White-Roth Machine Corp., Lorain, O. It consists essentially of a single-stage, positive-displacement cylinder driven through a cross-head by a Lorain engine.

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Automatic Weighing—*Continued from Page* 105

date back into the last century.

Fig. 2 shows the tip of a horizontal beam recorder. The lead screw is on the rear of the beam. Motion of the tip is limited to approximately 0.020-inch. As a load is applied to the beam, it moves to the top and the upper contact is made. Motor-driven lead screw moves the poise forward until the contact is broken. Unfortunately, since the beam is limited to a very short travel there is considerable tendency for the beam to "hunt" between the two contacts. To avoid this, the damping problem must be very carefully considered.

Follow-Up Servo—Measuring the displacement of the beam against a spring or pendulum offers certain advantages over a horizontal beam recorder. Fig. 5 shows a recorder equipped with a follow-up servo. A follow-up arm on a lead screw drives up or down as the beam moves. A very sensitive beam switch is necessary for a high degree of accuracy. Motor operating the lead screw may be used to position step cams, indicators or any other mechanisms.

It can be seen that the motion of the follow-up arm is amplified by the beam switch. This switch is independently damped with the small dashpot. Fig. 6 shows the interior of the recording head. Step cams operated by the drive motor and the sensing fingers are visible. Step cams are similar in operation to those used in many forms of computing and allied machinery. They allow the position of a cam either along an axis or around a point to be translated into the linear displacement of a sensing finger. After the wheels are positioned the sensing figures move in toward the center of the cam. Amount of movement is the measure of the figure. If the figure is attached to type bars or other device, the position of the cam may be easily noted.

Use of these step cams operating computing machinery in conjunction with this scale is shown in Fig. 5. Step cams in the left portion of the device are set from the scale by a servo. Various units on the right are separate computing mechanisms to perform the required mathematical operations.

Another form of the relay (off and on) servo is a disk positioned by the beam through a rack and pinion as in Fig. 8. A reversible motor causes a follow-up contact to seek the neutral zone between the contact arcs. This motor may be used to drive any other equipment. In spite of the apparent simplicity of this system a serious difficulty is introduced in the form of a tendency to hunt. Various methods of adding a controlled amount of mechanical friction or electrical damping can materially reduce hunting. This damping must not effect the final accuracy, although transient error may be greatly increased.

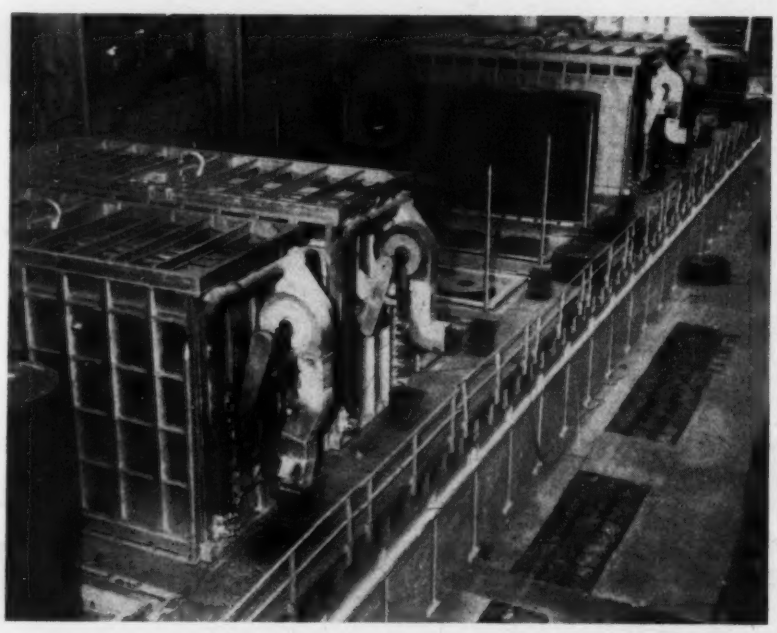
A much more satisfactory servo is one that will detect the error between input and output of the servo. This error can cause a correcting force to be applied proportional to its magnitude. By so doing, much more rapid and precise results may be attained.

This error may be detected in many ways. In a mechanical system a differential is frequently used. However, in the case of a weight recorder the input power requirements for a differential are considerable and would cause the scale beam to be precessed. Various electrical methods offer more practical solutions to this problem. The error may be measured in many ways electrically. However, they may all be reduced to a measurement of one of the following: Resistance, impedance, capacity and frequency.

Amplifier Added — Regardless of the detecting method used, it is usually necessary to add an amplifier to the circuit. In addition to the increase in sensitivity, an amplifier offers an ideal location to insert an anticipating or antihunt circuit. In most cases a relatively simple resistance coupled, alternating current amplifier will prove satisfactory. However, at times it may be necessary to use a direct current amplifier which introduces numerous disadvantages.

Due to the difficulty of attaining absolute linear components for an electrical system it is desirable that a balanced circuit be adopted for comparison between the pick-up and the output. This allows more freedom in the sensing elements since they can be made always to drive to a null or balance point.

Displacement of the beam may be detected by resistance measurements in many ways. For example, a circular potentiometer with a contact operated by the rack and pinion or a straight potentiometer with the contact attached directly to the beam may be used. Either of these devices may cause a slight error due to friction and/or backlash. Effect of temperature must always be considered



INCREASED ANNEALING CAPACITY: Recently installed at Weirton Steel Co., Weirton, W. Va., are these four new annealing furnaces and their twelve bases all of which were supplied by Surface Combustion Corp., Toledo, O. In a single operation they are capable of processing 300 tons, or more than 100 miles, of steel strip. Three bases for each portable furnace permit loading, annealing and cooling to be performed simultaneously. Installation of these new facilities is part of a large program of improvements and expansion that has been carried on continuously since the end of the recent war

if the automatic weigher is to be subjected to large changes. This is particularly true in the case of resistance measurements.

Impedance measurement is an ideal method of error detection. Several standard devices that may be directly attached to the beam are on the market. A differential transformer may be held rigidly with the plunger attached to the beam. The induced electromotive force, after being amplified, can be used to drive a two-phase motor and balance a similar transformer to a null. Attaining linearity and identical characteristics between various components is somewhat difficult. Likewise, temperature changes can cause problems; however, these are generally in the type of mounting used.

Capacity Measurements—Capacity measurements may be used in many ways. Unfortunately, humidity and other external effects often cause serious difficulties. Capacity sensitive devices have frequently been used for pressure and force measurements in laboratories where adequate calibration equipment is readily available.

Possibility of using frequency shift has not been well explored. Both the piezoelectric effect and the magnetostrictive effect offer possibilities. At present some use of crystals for force and pressure measurements is made. However, these devices would not be satisfactory for a static load.

Recently, an entirely new vista of weighing methods was opened by use of precision strain gages. Extensive work has been done with strain gages to develop them into a fairly satisfactory weighing method. The gages are incorporated into a load cell which must be accurately calibrated. Since these units are sensitive to one part in several million, a solid block of steel with gages attached may be used for the entire detecting system.

One of the most serious difficulties involved in a device of this sort is temperature compensation and the necessity of either using constant modulus materials or otherwise compensating for reduction of modulus or a change in physical dimensions, with a change in temperature. Although these devices are still hardly out of the experimental stage, in the near future it may be possible for electronic scales to replace many mechanical scales.

Impedance Strain Gages—Impedance strain gages may be even superior to resistance gages. Although they require comparatively more movement, their accuracy and dependability may be superior. Several methods have been devised that make it possible to avoid entirely the use

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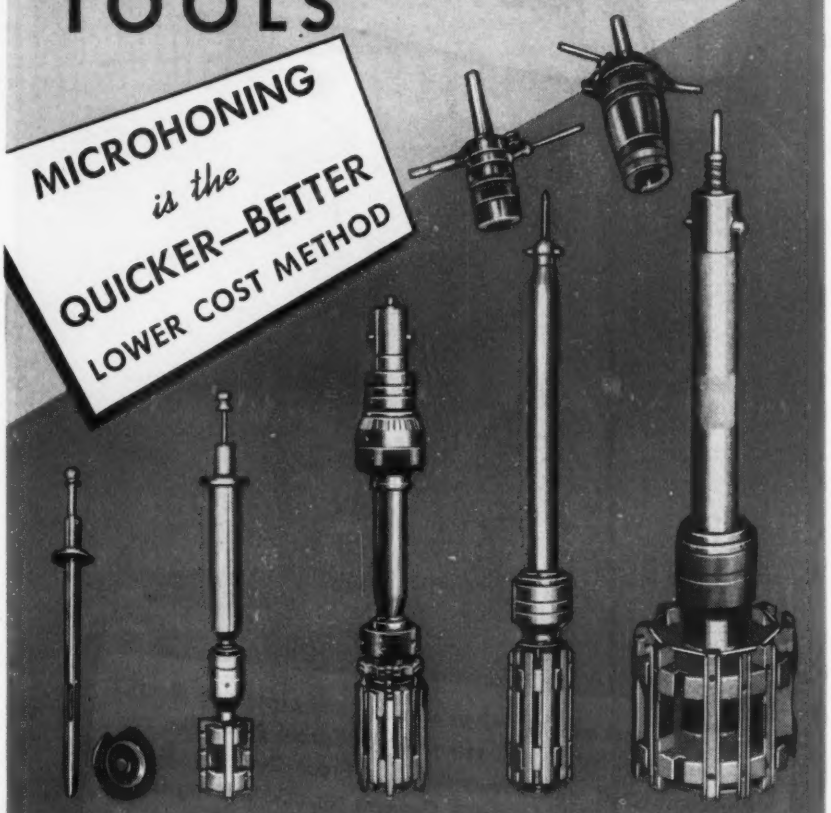
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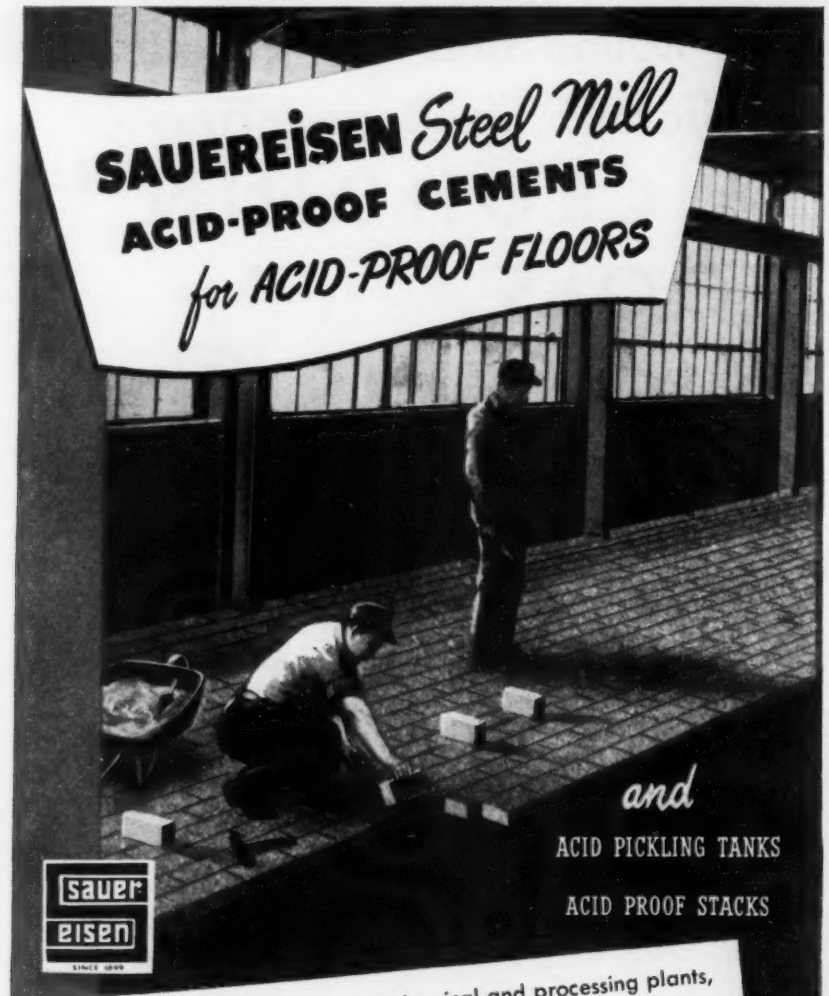

In leading steel mills as well as chemical and processing plants, tanneries, dairies and oil refineries, acidproof floors like this are constructed with Sauereisen Acid Proof Cements. Many firms also use these Steel Mill Cements for acid pickling tanks and acid proof stack construction.

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of levers. These gages may also be attached to a standard scale in such a way that they can operate as a position detector and carry on the function of a standard recorder at a remote point by controlling indicating equipment through a servo.

Many major changes appear to be in the offing for the entire scale industry. In the relatively near future the need of scalemen with a firm knowledge of electronics and instrumentation will be increased. Although no one would anticipate replacement of these most present weighing machines by new machines, there will be a decided trend toward weighing machinery that will do more and require less man-hours of supervision.

Stainless-Clad Sheets Widen Designers' Field

Possibilities for an endless variety of applications, freezing units, stove tops, architectural trim, automotive accessories, washing machines and a host of others are offered designers and engineers by an easily formed, corrosion - resistant, stainless - clad steel currently manufactured by Alan Wood Steel Co., Conshohocken, Pa.

Marketed under the name of Permaclad, the new metal sheets consist of a layer of stainless inseparably diffusion welded to a mild steel backing. These are reported to be metallurgically correct on one side for maximum corrosion resistance, yet possess ductility and other physical properties of plain carbon steel.

Cost of the material, according to the company, runs about 50 to 60 per cent of that of solid stainless. Material also can be arc or spot welded, and even soldered with ease.

—o—

With no changes made in physical dimensions, the 100-watt 60-inch T17 fluorescent lamp, made by Sylvania Electric Products Inc., New York, consumes only 85 watts of energy when operated with standard 100-watt ballasts and auxiliaries. In addition, it burns as long as the 100-watt lamp and has the same maintenance characteristics. Lamps are available in a complete line of color.

—o—

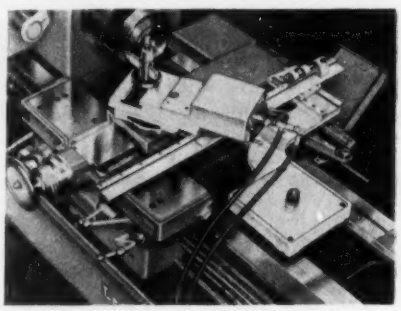
How to design wheels is the subject of Machine Design Sheet No. 103, one of the series of "Thought Starters" on welded design published by Lincoln Electric Co., Cleveland. Given is graphic and basic information on the design and manufacture of gear blanks, pulley gears, vee pulleys, cone friction wheels and hand and fly wheels.

New Products and Equipment

Hydraulic Tracer

An attachment for shaft and profile contouring which can be installed without drilling or fitting on LeBlond heavy duty lathes in the field is announced by R. K. LeBlond Machine Tool Co., Cincinnati 8, O. Hydraulically operated and known as the Hydra-Trace, the device accommodates stock to the full swing capacity of the lathe and does not interfere with cross slide travel or prevent the use of the taper attachment. It is offered in six sizes for use on LeBlond heavy duty engine, the RT series engine and tool room, plain and sliding bed gap, and rapid production lathes.

Device is mounted on a special compound rest which is interchangeable



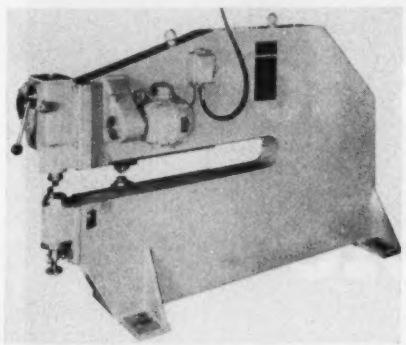
with the regular compound rest in a few minutes. It is intended for both between centers duplicating and for profile facing. The shift from one to the other can be made easily and quickly. With no drilling or fitting required, the Hydra-Trace may be used on several different types of LeBlond lathes of identical size. Operating on the template-actuated stylus principle, the device brings automatic stepless contouring to the standard lathe. A complete range of operations may be performed, including straight facing and turning, tapers of any kind, shoulders, necking, concave and convex surfaces and spherical surfaces.

Check No. 1 on Reply Card for more Details

Plate Cutting Machine

Beading, folding, and straight, circular or design cutting of metal up to ⅜-inch in thickness may be performed with the sheet and plate working machine manufactured by Haldex Co., Halmstad, Sweden and distributed by Pullmax Co., 5222 N. Spaulding Ave., Chicago 25, Ill. Cutting is accomplished by two tools, the upper one operating at a very high speed. It does not chip or deform the metal being worked. Finished edges are smooth and perpendicular and need no reworking.

Cutting tools do not penetrate the metal but shear it to the breaking point which causes a smooth cut. Mild and stainless as well as all non-

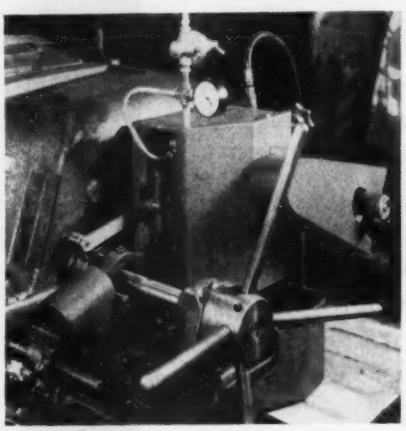


ferrous metal can be easily cut into intricate designs by unskilled labor after little practice. A quick-locking centering device permits fast production of circular plates. A variety of tools may be used for many special operations, such as slot cutting, nibbling, beading and folding.

Check No. 2 on Reply Card for more Details

Grinder Feed

Designed for use on a No. 2 Cincinnati centerless grinder, the Auto-feed attachment, announced by Bennett Equipment Co., 4725 Elory, Detroit 7, Mich., is made to handle any tapered



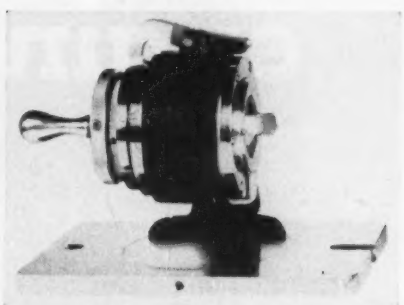
or shoulder work. Its attachment permits the grinder to be operated either automatically or manually with a change-over time of less than 2 minutes. Quickly installed, it is said to have increased production up to 300 per cent in actual usage.

Automatic yoke is attached to the grinder worm wheel, allowing the hand infeed lever to remain on the grinder. Change over from manual to automatic operation is by tightening the pinch bolt on the attachment yoke and loosening the pinch bolt on the hand infeed lever. Drive arm is actuated by two reciprocating cams. An air operated ram ejects the work at the finish of each grinding operation.

Check No. 3 on Reply Card for more Details

Grinding Fixture

Provision for flat or concave grinding of chip breakers on tungsten carbide insert type bits is provided by the compact precision grinding fixture, introduced by Royal Oak Tool & Machine Co., 621 E. 4th St., Royal Oak, Mich. The fixture has a preloaded ball bearing spindle which is ground in the fixture to assure per-



fect concentricity. Collets for square, round, triangular and rectangular carbide inserts are available in ¼, ⅜ and ½-inch sizes.

Fixture is designed for use with surface grinders, but can also be used with cutter grinders. Clearance from base to face of collet is 5½ inches, permitting vertical positioning under the wheel. Calibrated scales provide for setting at desired angles and interchanegable index plates assure true triangular and square forms.

Check No. 4 on Reply Card for more Details

Sand Riddler

Enough sand to cover an ordinary pattern in a 12 x 18-inch flask is riddled in 2 seconds by the Roller Riddle, product of Roller Riddle Corp. of Port Huron, Mich. In eliminating a hand operation, the machine uses a ¼-horsepower single phase motor, combined with a limit switch which automatically activates the riddle basket, oscillating 900 times per minute. Various other motor types, voltages and sizes may be supplied if required.

The riddle basket has a sand capacity of 60 pounds and is mounted on rubber blocks. It has an adjust-

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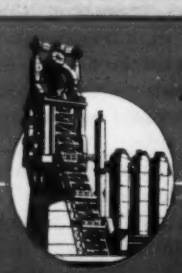

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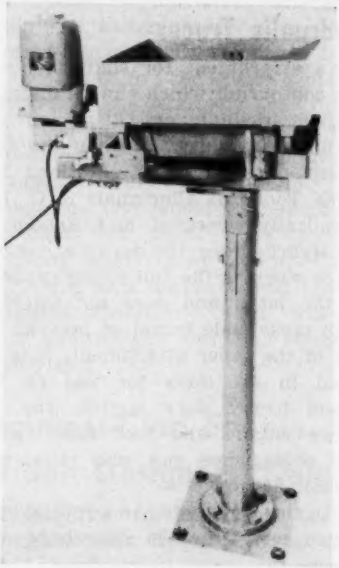
able column with 31 inches of travel which makes the machine highly flexible. Both single and double (illustrated) types are made, both fea-

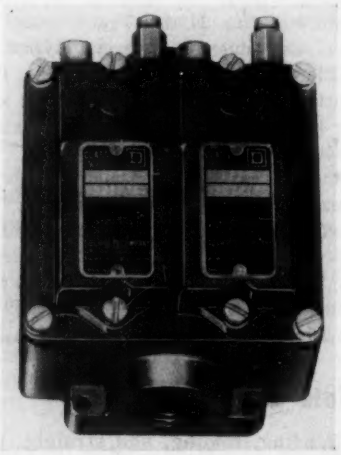


turing sealed roller bearings throughout which require no lubrication. Shaft is covered with tube rubber so that no sand or dirt can work into the motor.

Check No. 5 on Reply Card for more Details

Limit Switches

Two new duplex limit switches, announced by Square D Co., 4041 N. Richards St., Milwaukee 12, Wis., enable designers to use only one switching unit when two limit switches are needed. A single duplex



switch can also be used to replace two separate switches on present machines or equipment. By using two of the oiltight switches in a single duplex assembly, only one run of conduit is required for necessary control wires. Both surface and flush mounting types are available.

Each switch has a single-pole,

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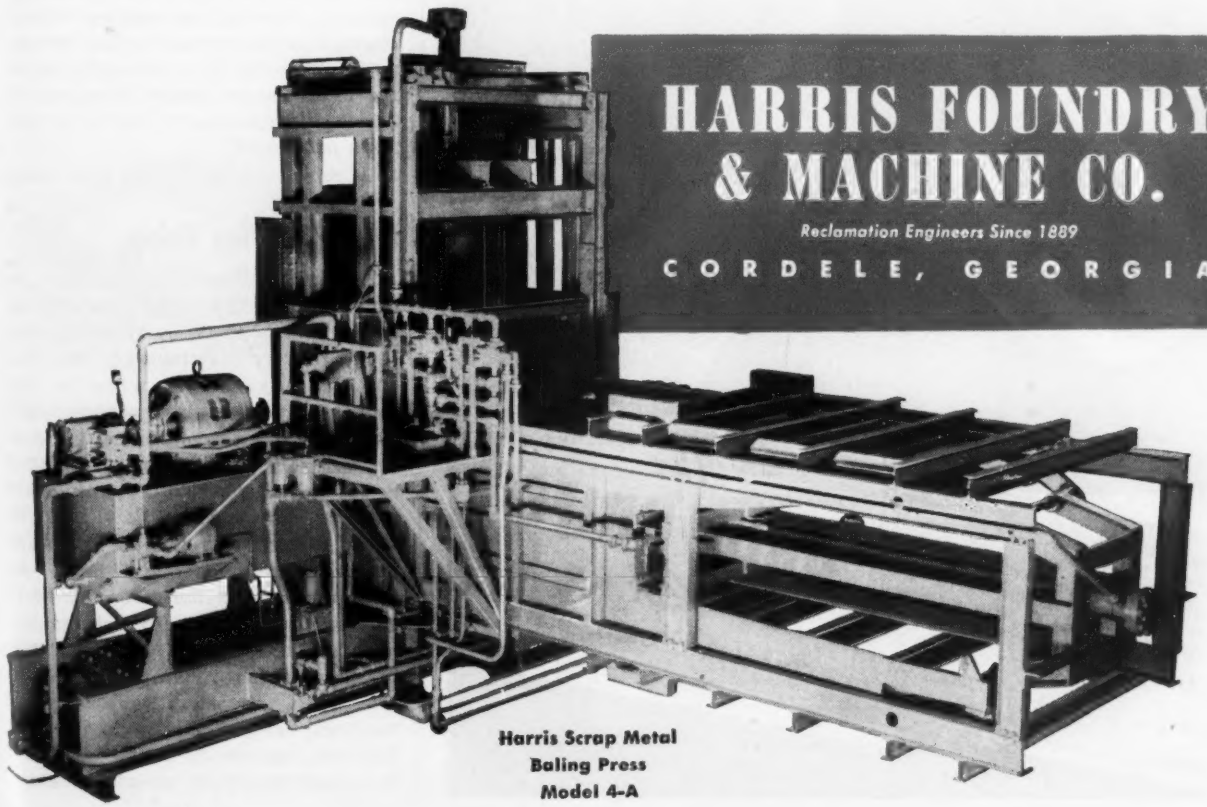
EFFICIENCY

EXTRA PROFIT

The Harris 4-A Baler is designed for efficient operation, low cost maintenance, and lower initial and installation cost. The greater profit thought and the skillful engineering that has gone into the design of the Harris Baler is evident in: 1—The vertically operating tramper door, which means continuous operation. A second charge can be loaded while the first is being compressed. 2—The Harris 4-A Baler is equipped throughout with micromatic honed cylinders, which means perfect concentricity and extremely close tolerances. This greatly increases the life of all packings as well as the life of the machine itself and assures smooth operation. 3—The Harris 4-A Baler is equipped with Vickers vane type rotary pumps and ultra modern valve system.

The Harris 4-A Baler is easily adapted to use with conveyorized systems for delivering scrap to the press and the finished bundles to railroad cars. This reduces the production cost per bundle and means more profit for you.

Make Safety First the rule in your plant. Reduce the number of man-hours lost because of accidents and cluttered shops. Increase the safety and efficiency of your plant and handle scrap at a profit with Harris 4-A Balers.



HARRIS FOUNDRY & MACHINE CO.

Reclamation Engineers Since 1889

CORDELE, GEORGIA

Harris Scrap Metal Baling Press Model 4-A

OK

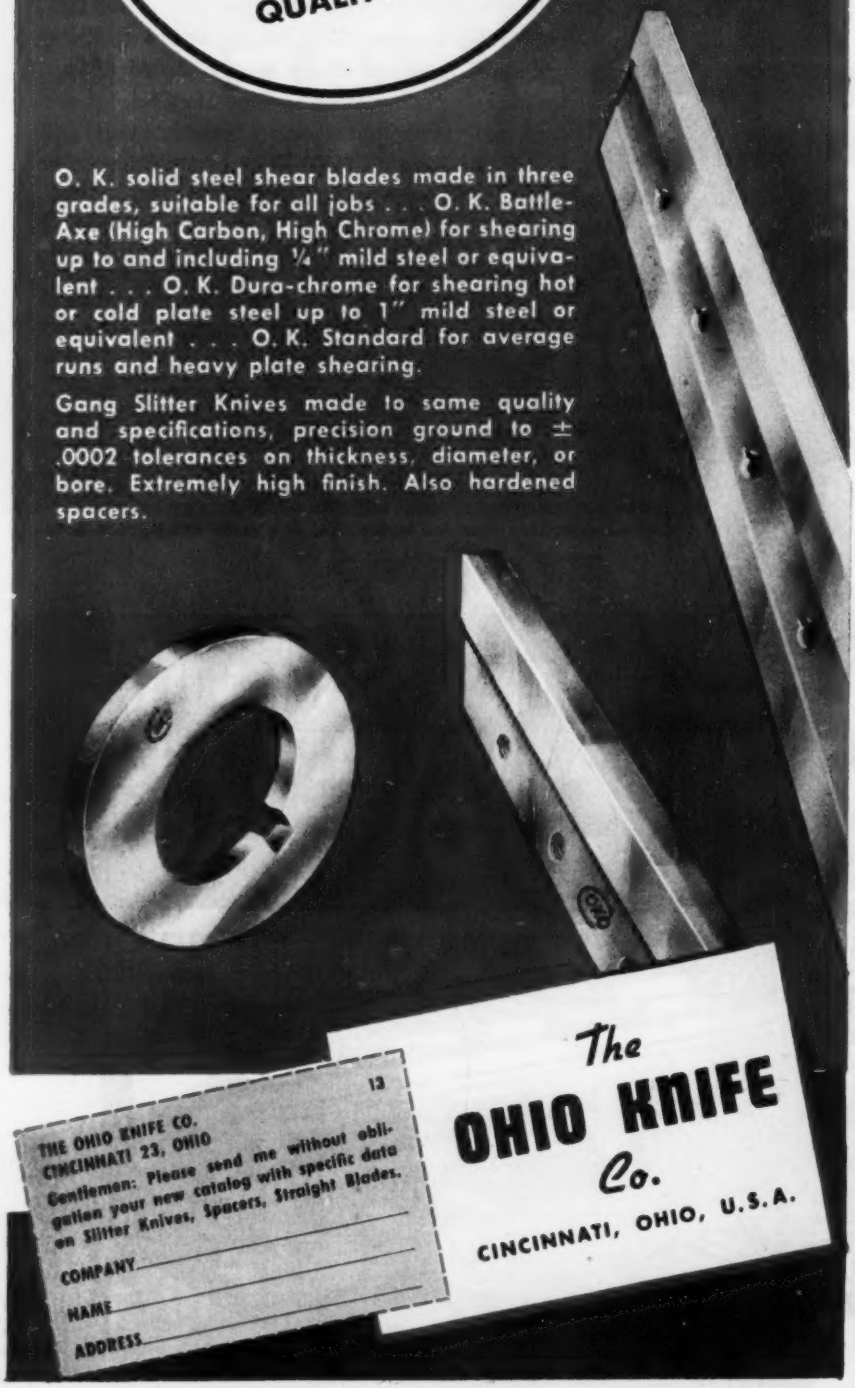
SHEAR BLADES

are unequalled for

CLOSE TOLERANCE
UNIFORM HARDNESS
QUALITY STEEL

O. K. solid steel shear blades made in three grades, suitable for all jobs . . . O. K. Battle-Axe (High Carbon, High Chrome) for shearing up to and including ¼" mild steel or equivalent . . . O. K. Dura-chrome for shearing hot or cold plate steel up to 1" mild steel or equivalent . . . O. K. Standard for average runs and heavy plate shearing.

Gang Slitter Knives made to same quality and specifications, precision ground to ± .0002 tolerances on thickness, diameter, or bore. Extremely high finish. Also hardened spacers.



THE OHIO KNIFE CO. 13
CINCINNATI 23, OHIO
Gentlemen: Please send me without obligation your new catalog with specific data on Slitter Knives, Spacers, Straight Blades.
COMPANY
NAME
ADDRESS

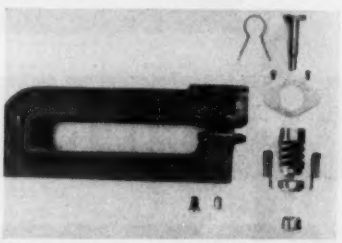
The OHIO KNIFE Co.
CINCINNATI, OHIO, U.S.A.

double-throw snap action mechanism and two electrical circuits. One circuit is normally open and the other normally closed. Switches are offered with either two push rods, two plain roller arms or two one-way rollers. Return springs can be readily changed for the reverse direction of operation. Switches are rated up to 600 ac or dc and will operate in temperatures up to 200° F.

Check No. 6 on Reply Card for more Details

Hole Punching Unit

Independent and self-contained, the new line of type BL hole punching units with new punch retainers, made by Wales-Strippit Corp., North Tonawanda, N. Y., may be set up in unlimited patterns and put in operation soon after a pattern is released for production. Patterns are quickly and



easily set up by locating and locking these units into exact position on templates or T-slotted plates in press brakes or stamping presses.

After a setup has been run, the same group of units may be used and reused in other hole punching patterns thereby eliminating "dead storage" of setups and tooling investment. Type BL hole punching units are available to punch holes up to 2 inches in diameter in up to ⅛-inch thick mild steel.

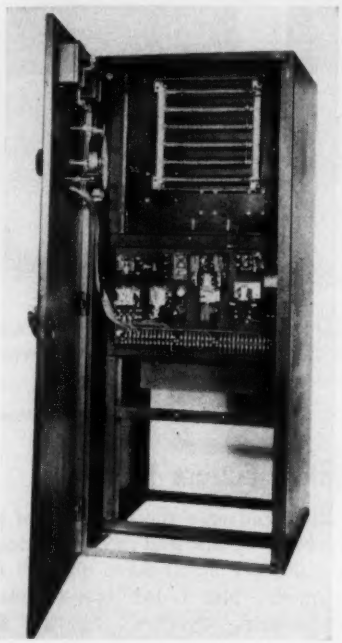
Check No. 7 on Reply Card for more Details

Motor Starting Relay

Using a "yardstick", which is time, the new type ASR synchronous motor starter, made by Westinghouse Electric Corp., Pittsburgh 30, Pa., automatically decides when is the proper time to apply the direct current field which synchronizes the motor with the line. When the motor is started, this relay keeps comparing its time yardstick to the length of alternating current half cycles induced in the unenergized field. As the motor speed increases, the frequency of this induced voltage deminishes since rotor speed gradually approaches synchronous speed.

The relay, in effect, watches until the time for one-half cycle becomes just as long as its yardstick. Then it signals the field circuit to close.

It automatically selects the time for synchronizing when the rotor and stator poles are in the most favorable position (relative to each other) for the least mechanical shock when

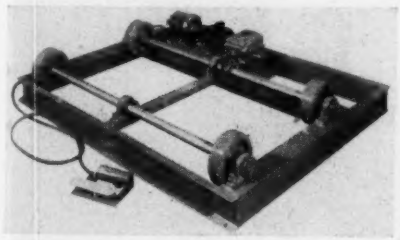


the direct current field is applied. This also provides maximum pull-in torque with least current surge from the power line.

Check No. 8 on Reply Card for more Details

Turning Roll

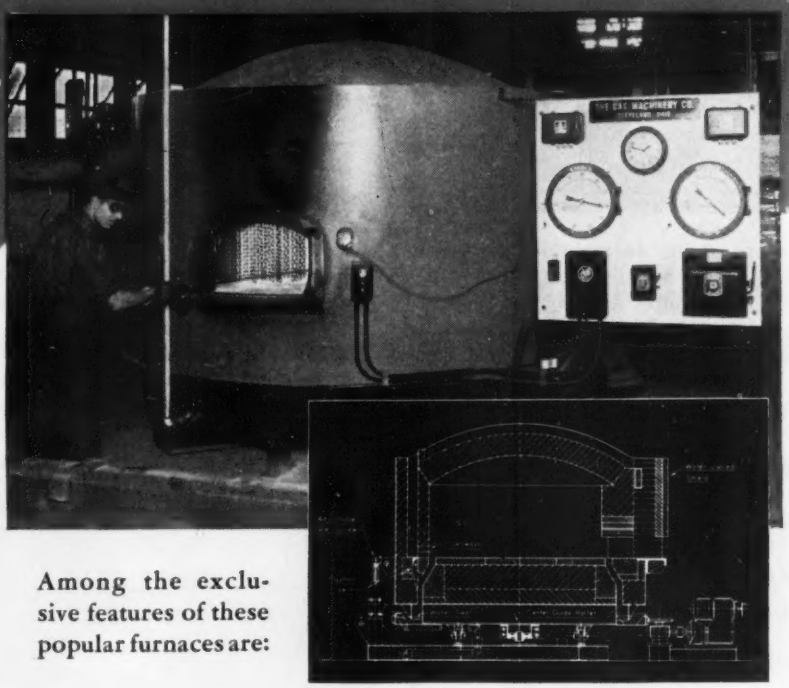
Used for the rotation of tanks and cylindrical shapes for welding as well as for painting tanks, the model RD-20 unit type turning roll, being marketed by Reed Engineering Co., Carthage, Mo., may also be used for



flame cutting of pipes and cylindrical shapes. It is equipped with four rubber-tired wheels, two of which are driven and two of which act as idlers. It is adjustable to handle any range of diameters from 3 inches to 6 feet and any length from 12 inches to 12 feet.

Turning roll capacity is 2000 pounds total weight. The machine is equipped with a variable speed transmission which gives any range of speeds from 0 to 120 inches per minute. Antifriction bearings are used throughout and all primary reduc-

HOW LOW COST OPERATION *and* HIGH PRODUCTION are built into GASMACO *Industrial* FURNACES



Among the exclusive features of these popular furnaces are:

1. Hearth Table Construction, to keep warpage at a minimum.
2. Combination of Water Sealed Hearth and Syphon Vents, to short circuit water vapor.
3. Jack Screws, to lift casing when billets become lodged in hearth tables.

The features help provide the low cost operation and high production for which Gasmaco furnaces are well known.

A small difference in design can mean a vast difference in performance. Gasmaco engineers are men of long experience in this field, with hundreds of furnaces to their credit, which makes for low cost operation and maintenance, accurate heating, and high production.

Furthermore, an adequate stock of parts is available at all times. Let us send you complete information on the furnace for your needs.

THE GAS MACHINERY COMPANY
16116 WATERLOO ROAD
CLEVELAND 10, OHIO

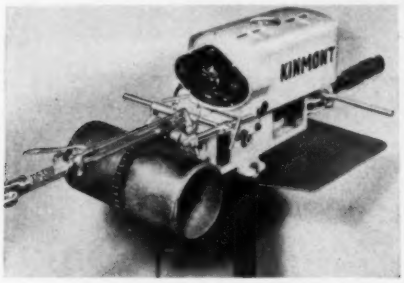
Designers Fabricators Erectors
Gas Plant Equipment and
Industrial Furnaces

tions are totally enclosed worm gear type. It comes complete with motor and foot-operated switch.

Check No. 9 on Reply Card for more Details

Cutting Torch Attachment

Provision for easy and fast adjustment of a cutting torch attachment in handling a wide range of pipe sizes is a feature of the new accessory for use with the universal power unit manufactured by Kinmont Manufacturing Co. Inc., 716 W. Wilson Ave., Glendale 3, Calif. The attachment



has the ability to maintain a smooth bevel and a square cutoff across the end of the pipe. It may be used on any pipe size from 3 to 36 inches in diameter and on tanks up to 10 feet in diameter when turned on a power rack.

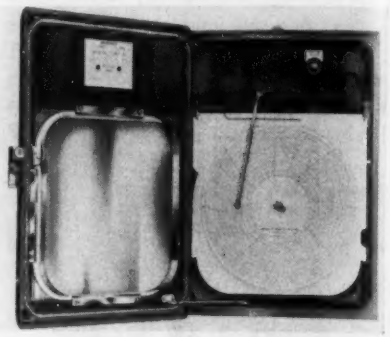
Turning speed of the power unit is controllable while cutting action is in progress. A foot switch controlling the turning operation leaves the operator's hands free to control the torch and speed adjustment. A split link chain drive permits rapid fastening and unfastening of the work being turned. The chain holds the pipe tightly locked in position and turning against fixed rollers on the power unit.

Check No. 10 on Reply Card for more Details

Running Count Recorder

Recording the total count of intermittent operations and the time at which one occurs is the function of a new recording instrument, the running count recorder, announced by Bristol Co., Waterbury 91, Conn. It may be used on production machinery to record work producing operations or the number of pieces produced. It plots on a circular chart, a curve of the number of operations against time.

Total number of operations or pieces produced can be easily found by multiplying the number of complete pen traverses across the chart by the count per traverse for which the instrument is calibrated. Hourly rate of production can also be easily read from the chart. Interpretation gives information regarding effect of fatigue on operators, variations in productibility between operators, effec-



tiveness of job training programs, and the effect of variations in working conditions.

Check No. 11 on Reply Card for more Details

Lighting Fixture

Rapid and safe maintenance of inaccessible lights and reduced cleaning costs are advantages claimed for the model No. L-141 disconnecting and lowering overhead lighting fixture, manufactured by Thompson Electric Co., 1101 Power Ave., Cleveland 14, O. A remotely controlled latching type overhead disconnecting

EMPHASIS PLACED ON OPERATION CARE

Warning - instructions, necessary information

Baker Brothers, Inc. of Toledo, Ohio, produce machine tools requiring a flow of cutting or cooling liquid at the point of drilling or boring. Shown here, is one of the ways they use Topflight Tape. The instruction sticker, "Do Not Run Pump Until Shaft is Free to Rotate" is placed on motor pumps supplying cutting or coolant liquids. When intricate machine tools are delivered and set up, operation instructions are at operator's eye level.

Instruct operator

Topflight printed, pressure-sensitive, cellophane tape is applied in an instant. It will stick to any clean, dry surface at once. Finger pressure is all that is necessary to make it stick. That is why so many firms are turning to Topflight for important warning or instruction stickers. Expensive machine tools must have special care and handling.

TOPFLIGHT TAPE COMPANY

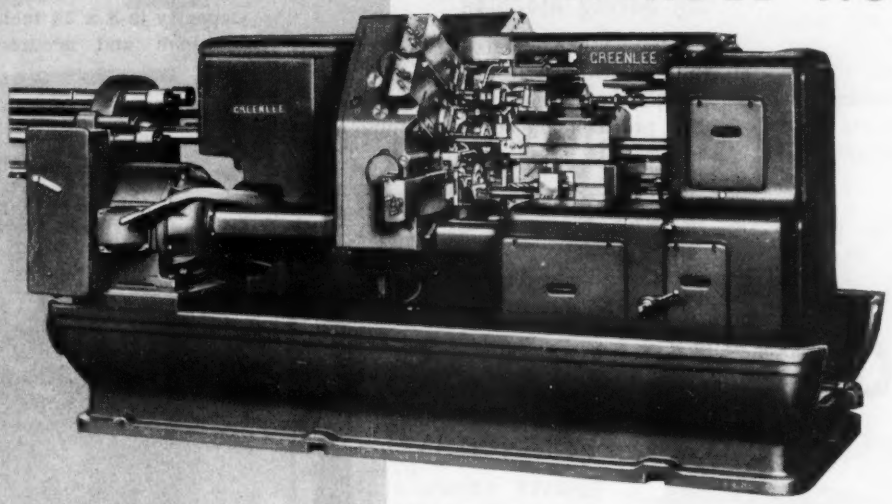
ERWIN HUBER, *President*

YORK PENNA.

RUGGED, COMPACT, EFFICIENT

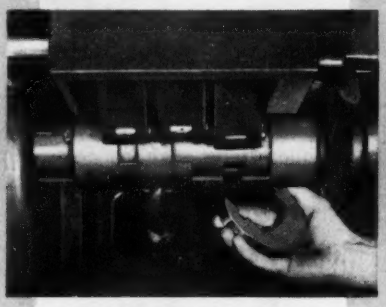
GREENLEE

SIX-SPINDLE AUTOMATICS



CUT COSTS *on all kinds of* JOB SHOP WORK

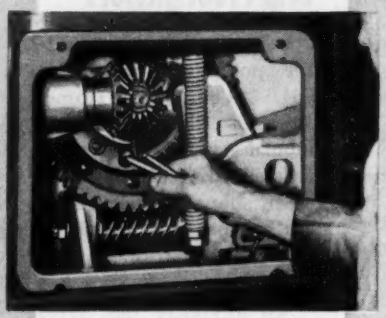
GREENLEE Automatic Screw Machines are rugged, compact, surprisingly simple in operation and maintenance, and unusually versatile. *Check these time-saving and cost-cutting features.*



CHANGING A CROSS SLIDE CAM

INTERCHANGEABLE CROSS SLIDE CAMMING

All six cross slide cams can be replaced in less than 6 minutes, and only 15 cams handle 90% of the average job-shop requirements.



SETTING TOOL SLIDE STROKE

STANDARDIZED TOOLING SPEEDS SET-UPS

With identically machined tool cavities and interchangeable tool holders, Greenlee Automatics make quick job changes a cinch. You save in equipment costs, too!

A SIMPLE ADJUSTMENT SETS THE STROKE

A graduated worm wheel permits an accurate setting of the tool slide stroke in a simple, easy operation without guesswork, fuss, or bother.

A ROOMY TOOLING AREA HELPS OPERATORS

There's plenty of elbow room in the tooling area, making it easy for operators to accurately position tools and attachments for best results.

PRODUCTION MACHINERY
GREENLEE

WRITE TODAY... and let us send you our 20-page book on Greenlee Automatics. Ask for Screw Machine literature.

GREENLEE BROS. & CO.
1923 MASON AVE., ROCKFORD, ILL.

DRILLING, BORING, TAPPING MACHINES • SCREW MACHINES • TRANSFER PROCESSING MACHINES

switch combined with a fixture lowering and raising device permits lowering of lights for cleaning, lamp replacement or repair. A complete hanger installation consists of upper and lower assembly units, length of chain or cable for raising and lowering the fixture, a locking device and a pulley.

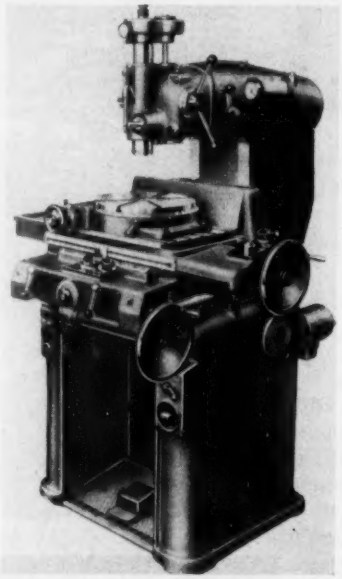
Fixed upper assembly unit, secured to supporting structure, carries a pair of cup type contacts to which power feed lines are attached. Lower assembly unit which supports the fixture is fitted with two engaging contacts which complete the circuit when assembly is in raised position. Hangers are available for both indoor and outdoor installations using incandescent, fluorescent or mercury-vapor lighting.

Check No. 12 on Reply Card for more Details

Jig Boring Machine

Completely centralized control from the operating position in front of the machine is the feature of the model 2BA precision jig boring machine announced by Hauser Machine Tool Corp., Manhasset, N. Y., factory representative of Henri Hauser, Ltd., Bienne, Switzerland. Micrometer screws are made of special steel and hardened and precision ground. The microscope is manufactured by a method of three-point suspension and is independent of the rotating part of the spindle.

Capacity is 8 x 14 inches, readings 0.0001-inch and accuracy of slide



locations 0.00015-inch. Machine can be used for production work when the cost of jigs is not warranted. All operations such as centering, marking out and checking may be carried out within the maximum accuracy of the machine.

Check No. 13 on Reply Card for more Details

Drip-Proof Motors

Drip-proof design has been adopted for polyphase motors in the 254, 284, 324 and 326 frames, made by Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14, Mo. Motor frames are formed of heavy rolled steel, shaped to accurately center the stator core and to provide passages between the frame and the core for ventilation.

An auxiliary fan, larger in diameter than the armature of the motor, draws air through openings in the front endplate, forces it through these passages and out through the endplate openings on the drive end. Screens on the endplate openings give protection from articles being drawn into the motor. Both sleeve and ball bearing motors of the new design are completely drip-proof when mounted in the normal horizontal position, and when the endplate has been correctly rotated.

STOPS CORROSION LOSSES

RESISTS ACIDS, ALKALIES, WATER, ALCOHOL, OILS, GREASES

EASILY APPLIED WITH SPRAY OR BRUSH, DRIES QUICKLY

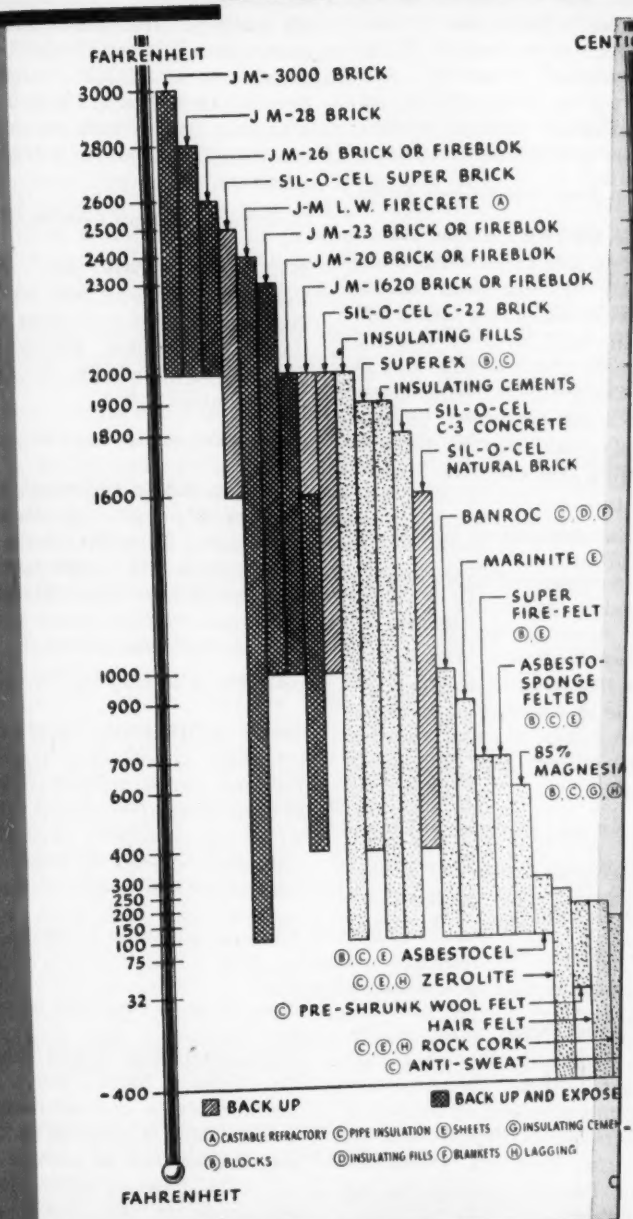
CORROSION goes hungry in the plant protected by Tygon Paint. This remarkable coating, proven over a ten-year period, forms a "live" plastic film so tough that corrosion can't eat through. Its use cuts maintenance costs to the bone, adds extra life to any equipment subjected to corrosive fumes, condensates or spillage. Write today for your free copy of Bulletin 709.

Resists Acids, Alkalies, Oil, Water, Alcohols • Applied by Spray Gun or Brush • Air Dries Quickly • Non-toxic and Non-Flammable when dry • Will not oxidize, flake-off or chip.

U. S. STONEWARE
Akron 9, Ohio

Ready reference chart...

Johns-Manville THERMAL INSULATIONS



FOR EVERY TEMPERATURE JM EVERY

For further information write your nearest J-M office or Johns-Manville, Z

Yours... for better insulation service!

Now, you can see at a glance the recommended insulation for every temperature range, from minus 400F to plus 3000F.

It's all on this convenient Johns-Manville Thermal Insulation Chart (11½" x 18") available for hanging in your office or on your plant wall.

Each insulation in this group of Johns-Manville products is tailor-made to do a specific type of job *best.* And, as part of the Johns-Manville Insulation Service, specialists are available to help you with present insulation problems . . . or with those connected with future plans.

By having these men select and apply Johns-Manville insulations, you will be dealing with men who have grown up in the business. You'll find that it will pay, in the long run, to have these experts help you... *because they have to their credit more man-hours of insulation application experience than all other similar types of organizations combined.*

For your copy of this chart, just fill in and mail the coupon below.

Johns-Manville
Box 290
New York 16, N. Y.

Please send me copy of Johns-Manville Insulation Chart IN-6D.

Name_____

Title_____

Company_____

Address_____

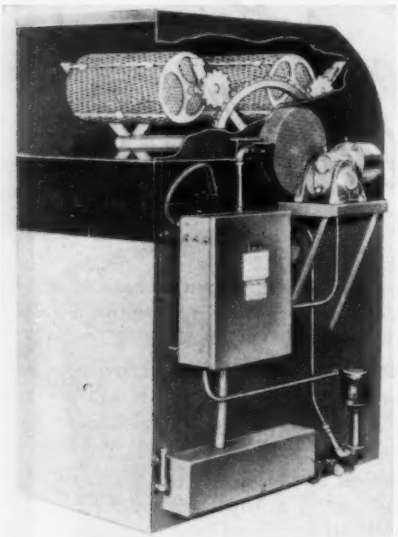
City_____ State_____

these motors are drip-proof in the side wall or ceiling horizontal positions because they have no openings in the frames.

Check No. 14 on Reply Card for more Details

Vapor Degreaser

Called the tumbling Rotomatic, a new conveyorized vapor degreaser machine, introduced by Phillips Mfg. Co., 3475 W. Touhy Ave., Chicago 45, Ill., eliminates the possibility of solvent cuppings in crevices and hollows of odd-shaped pieces. The tumbling basket is rotated by a small



spur gear which in turn rotates on a large ring gear. As the reel rotates the tumbling baskets are then in turn rotated around this ring gear as it goes up and down in the vapor and still tumbling they come out on the other side.

Tumbling basket makes approximately nine complete revotutions to each one revolution of the reel. Each basket is fitted with the tubular shaft with a spring stub-shaft carried on one end for loading and unloading, making these tumblers readily removable by compressing the spring and removing the tumbler.

Check No. 15 on Reply Card for more Details

• • •

FLEXIBLE COUPLING: A flexible coupling with a synthetic rubber insert is offered by Boston Gear Works, Quincy, Mass. It is available for shafts ⅜ to 1½ inches.

Check No. 16 on Reply Card for more Details

CHAIN VISES: Baldwin-Duckworth Division of Chain Belt Co., Springfield 2, Mass., announces two chain vises. No. 1 will handle single width roller chains from ½ to 1 inch pitch and double width roller chains D-40 and D-50. No. 2 will handle single width chains from 1 to 2 inches pitch and double width chains from D-80 to D-160.

Check No. 17 on Reply Card for more Details

METER: Designated as type IHM-1, a new single phase combination watthour and thermal watt demand meter for industrial use is announced by General Electric's Meter and Instrument Division, Schenectady 5, N. Y. It can be installed wherever rate structures require determination of demand as well as energy, without increasing size of original installation.

Check No. 18 on Reply Card for more Details

VIBRATION METER: A new vibration meter designed to read vibration levels directly in root mean square inches or root mean square inches per second when used with a velocity pickup made by the MB Mfg. Co., is offered by Calidyne Co., Winchester, Mass. It is a self-contained, battery operated unit with internal calibration requiring no external power connection.

Check No. 19 on Reply Card for more Details

VALVE: A new type of high pressure reducing valve employing internal pilot piston operated construction is announced by Leslie Co., Lyndhurst, N. J. Class HS valve is designed for steam, air or gas service. It is available in sizes 1, 1¼, 1½ and 2 inches with series 90 or 150 flanges or welding ends.

Check No. 20 on Reply Card for more Details

SPIRAL DRILLS: A new line of carbide tipped spiral drills is offered by Super Tool Co., Detroit 13, Mich., in sizes 3/16 to ½-inch.

Check No. 21 on Reply Card for more Details

DUPLEX STRAINER: A duplex strainer to handle fluids with a high solid content without the necessity of interrupting pipe line operation to clean the strainer is offered by J. A. Zurn Mfg. Co., Erie, Pa. Units are suitable for intermittent as well as continuous flow.

Check No. 22 on Reply Card for more Details

CLEANING STATION: Sani-Spray goggle cleaning station, offered by Allen Optical Co., Buffalo, N. Y., is operated by a pushbutton control that releases a fine atomized spray of fog-proofing cleaner from a side orifice in the cabinet.

Check No. 23 on Reply Card for more Details

COATING: Minnesota Mining & Mfg. Co., St. Paul 6, Minn., announces a removable protective coating which protects polished metal stock from die marks, scratches and abrasion during cupping, forming and drawing operations. Designated as 3M strippable coating, it can be sprayed, brushed or roll-coated on finished metal surfaces.

Check No. 24 on Reply Card for more Details

CLUTCH: A new compact type automatic centrifugal clutch adaptable to all standard fractional horsepower electrical or internal combustion units is offered by Yoder Clutch Corp., Orrville, O. It has a 2¼ inch outside diameter by 1½ inch overall length including a standard 2 inch V-belt sheave.

Check No. 25 on Reply Card for more Details

WELDING ROD: An internally fluxed gas welding rod for welding deoxidized copper is offered by Arcos Corp., Philadelphia, Pa. Self-fluxing property of Silbrax prevents repeated rod oxidation.

Check No. 26 on Reply Card for more Details

TORQUE BAR: Richmont Inc., Los Angeles 23, Calif., announces the Livermont Torq-Bar with torque ranges from 200 to 600 foot pounds. It is available with or without detachable head or with special heads built to customer's specifications.

Check No. 27 on Reply Card for more Details

RUST INHIBITOR: K32-64, a rust inhibiting action paint that is colorless and can be utilized on all metals is offered by Graham Co., Cleveland, O. It can be applied over treated or untreated, porous or unporous, new, old or welded metal. It can also be applied over rust after scales are removed and will stop rust from creeping.

Check No. 28 on Reply Card for more Details

TOOL HOLDER: Wheel Trueing Tool Co., Detroit, Mich., offers the Diamond-Miser, a special diamond tool holder which is installed on the grinding machine in a position that assures the diamond being presented to the wheel at the correct angle for efficient cutting.

Check No. 29 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Market Summary

FINISHED steel is moving into consumption at a record-breaking rate in the face of reported slackening operations in some areas of the metalworking industry. Based on latest official data, shipments are running at an annual rate of over 70 million tons, a figure not approached even during the height of wartime activity. At the same time, ingot production is booming along at the unprecedented rate of over 97 million tons a year. In the first two months of this year operations have averaged over 100 per cent of capacity, and no sign has yet appeared to indicate a slowdown is in prospect with producers entertaining sufficient tonnage to assure capacity production for several months to come.

DEMAND—Downtrend in steel demand, which has dominated the market so far this year, currently is showing signs of leveling off and trade sentiment seems a shade more optimistic. While still highly inventory-conscious, consumers appear to have made progress in reducing stocks where necessary and in various instances where they have withdrawn from the market they are either again releasing specifications or indicating more definitely when they will be in need of tonnage. Despite continued uncertainties in the business outlook, buyers generally are consuming a tremendous amount of steel. Most metalworking shops are continuing to operate well above prewar levels, though their breakeven points are admittedly much higher, and for that reason, if for no other, they are not only watching inventories closely, but also price trends. While leading steelmakers indicate no general reduction in prices is in prospect for the near future, nevertheless, buyers are checking on this point with increasing regularity.

SENTIMENT—Contributing to somewhat improved sentiment in the steel market is the fact that the warehouse trade currently reports a slight quickening in demand. Some leading jobbers who only recently reported a persistent decline in their day-to-day sales, now detect a turn for the better. Another encouraging development is the fact the decline in castings business appears to have been checked. At any rate, the drop in volume is reported leveling off in some districts. Castings prices are being adjusted to lower levels by the foundries and this appears to be paying off in improved sales.

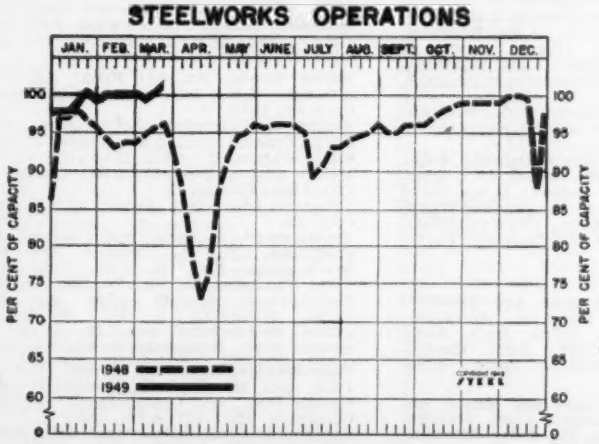
OUTLOOK—Few trade observers anticipate any material slowing down in steel production because of lack of demand over the coming quarter. While there are cutbacks reported here and there, and some cancellations, the mills still are having no difficulty keeping their rolling schedules filled. Admittedly, they are more concerned with development of new business and in all probability will have more tonnage to supply customers before the end of second quarter. However, as of today, they can still sell more tonnage than they can produce.

PRICES—No sign has yet appeared to indicate any general readjustment in steel prices is in early prospect. Production costs are still rising and so long as the steelmakers entertain capacity business there is every likelihood they will resist rising consumer pressure for downward revisions in price lists.

COMPOSITES—STEEL's arithmetical price composites were unchanged last week, with the exception of that on steelmaking scrap. Finished steel composite was $97.77 per net ton, semifinished steel, $75.75 per net ton, and steelmaking pig iron $46.22 per gross ton. Reflecting the downtrend in the scrap market, STEEL's composite on steelmaking scrap declined to $35.50 in the week ended Mar. 19, compared with $36.33 in the preceding week. A month ago it was $38.48, and a year ago it was $40.21.

OPERATIONS—Steel production edged upward again last week establishing a new all-time high with the national ingot rate estimated at 101.5 per cent of capacity, and output of ingots around 1,871,169 net tons.

STEELWORKS OPERATIONS



DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

	Week Ended March 19	Change	Same Week 1948	Same Week 1947
Pittsburgh	99	+ 1	95.5	99.5
Chicago	100.5	+ 1	94.5	95
Eastern Pa.	98	None	92	90
Youngstown	105	None	101	91
Wheeling	96.5	+ 1.5	92.5	93.5
Cleveland	105.5	+ 3.5	94.5	95
Buffalo	104	None	107.5	90.5
Birmingham	100	None	100	99
New England	87	None	85	94
Cincinnati	103	+ 4	102	91
St. Louis	89.5	+ 7	77.5	74.5
Detroit	104	+ 1	102	90
Western	99	— 1.5	..	..
Estimated national rate	101.5	+ 1	96	96.5

Based on weekly steelmaking capacity of 1,843,516 net tons for 1949; 1,802,476 net tons for 1948; 1,749,928 tons for 1947.

COMPOSITE MARKET AVERAGES

Arithmetical Price Composites*

	Mar. 19	Mar. 12	Month Ago Feb. 1949	Year Ago Mar. 1948	5 Years Ago Mar. 1944
Finished Steel	$97.77	$97.77	$97.77	$81.14	$56.73
Semifinished Steel	75.75	75.75	75.75	68.72	36.00
Steelmaking Pig Iron	46.22	46.22	46.22	39.34	23.00
Steelmaking Scrap	35.50	36.33	38.48	40.21	19.17

FINISHED STEEL WEIGHTED COMPOSITE†

Feb. 1949	4.20580c
Jan. 1949	4.20580c
Dec. 1948	4.20208c
Feb. 1948	3.54374c
Feb. 1944	2.38787c

* **STRAIGHT ARITHMETICAL COMPOSITES:** Computed from average industry-wide mill prices on Finished Carbon Steel (hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, standard and line pipe), on Semifinished Carbon Steel (re-rolling billets and slabs, sheet bars, skelp, and wire rods, on Basic Pig Iron (at eight leading producing points), and on Steelworks Scrap (No. 1 melting grade at Pittsburgh, Chicago and eastern Pennsylvania). Steel arithmetical composites, dollars per net ton; pig iron and scrap, gross ton.

† **FINISHED STEEL WEIGHTED COMPOSITE:** Computed in cents per pound, mill prices, weighted by actual monthly shipments of following products, representing about 82 per cent of steel shipments in the latest month for which statistics are available, as reported by American Iron & Steel Institute: Structural shapes; plates, standard rails; hot and cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip. January and February, 1949, figures are preliminary.

COMPARISON OF PRICES

Representative market figures for current week; average for last month, three months and one year ago. Finished material (except tin plate) and wire rods, cents per lb; semifinished (except wire rods) and coke, dollars per net ton, others dollars per gross ton. Delivered prices represent lowest from mills.

Finished Materials

	March 19, 1949	Feb. 1949	Dec. 1948	Mar. 1948
Steel bars, Pittsburgh mills	3.45c	3.45c	3.45c	2.90c
Steel bars, del. Philadelphia	3.8164	3.8164	3.79	3.356
Steel bars, Chicago mills	3.35	3.35	3.35	2.90
Shapes, Pittsburgh mills	3.275	3.275	3.275	2.80
Shapes, Chicago mills	3.25	3.25	3.25	2.80
Shapes, del. Philadelphia	3.4918	3.48	3.48	2.968
Plates, Pittsburgh mills	3.50	3.50	3.50	2.95
Plates, Chicago mills	3.40	3.40	3.40	2.95
Plates, del. Philadelphia	3.7256	3.7256	3.71	3.19
Sheets, hot-rolled, Pittsburgh mills	3.275	3.275	3.275	2.80
Sheets, cold-rolled, Pittsburgh	4.00	4.00	4.00	3.55
Sheets, No. 10 galv., Pittsburgh	4.40	4.40	4.40	3.95
Sheets, hot-rolled, Gary mills	3.25	3.25	3.25	2.80
Sheets, cold-rolled, Gary mills	4.00	4.00	4.00	3.55
Sheets, No. 10 galv., Gary mills	4.40	4.40	4.40	3.95
Strip, hot-rolled, Pittsburgh mills	3.275	3.275	3.275	3.05
Strip, cold-rolled, Pittsburgh mills	4.375	4.375	4.375	3.80
Bright basic, wire, Pittsburgh	4.325	4.325	4.325	3.775
Wire nails, Pittsburgh mills	5.775	5.775	5.775	5.20
Tin plate, per base box, Pitts. dist.	$7.75†	$7.75†	$6.80	$6.80

Semifinished

Sheet bars, mill	$67.00*	$67.00*	$67.00*	$60.00
Slabs, Chicago	52.00	52.00	52.00	45.00
Rerolling billets, Pittsburgh	59.00	59.00	59.00	45.00
Wire rod 7/32 to ¾-inch, Pitts. dist.	3.775c	3.775c	3.775c	3.175c

* Nominal. † 1.50 lb coating.

Pig Iron

	March 19, 1949	Feb. 1949	Dec. 1948	Mar. 1948
Bessemer, del. Pittsburgh (N.&S. sides)	$48.08	$48.08	$48.08	$40.996
Basic, Valley	46.00	46.00	46.00	39.00
Basic, eastern del. Philadelphia	50.3002	50.3002	50.17	42.004
No. 2 fdry., del. Pgh. (N.&S. sides)	47.58	47.58	47.58	40.496
No. 2 fdry., del. Philadelphia	50.8002	50.8002	50.67	42.504
No. 2 foundry, Chicago	46.25	46.25	46.25	39.00
No. 2 foundry, Valley	46.50	46.50	46.50	39.50
Southern No. 2 Birmingham	43.38	43.38	43.38	37.88
Southern No. 2 del. Cincinnati	49.43	49.43	49.09	41.857
Malleable, Valley	46.50	46.50	46.50	39.50
Malleable, Chicago	46.50	46.50	46.50	39.50
Charcoal, low phos., fob Lyles, Tenn.	66.00	66.00	66.00	55.00
Ferromanganese, f.o.b. Etna, Pa.	175.00	163.00	163.00	151.00*

* F.o.b. cars Pittsburgh.

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$37.00	$40.00	$42.75	$40.25
Heavy melt. steel, No. 2, E. Pa.	31.00	35.69	41.50	39.00
Heavy melt. steel, No. 1, Chicago	34.00	35.75	41.75	38.875
Heavy melt. steel, No. 1, Valley	37.25	37.75	42.75	40.25
Heavy melt. steel, No. 1, Cleveland	35.25	37.25	42.25	39.75
Heavy melt. steel, No. 1, Buffalo	35.75	40.50	48.50	44.00
Rails for rerolling, Chicago	45.75	48.19	70.38	49.625
No. 1 cast, Chicago	41.50	44.25	70.50	66.00

Coke

Connellsville, beehive furnace	$14.50	$14.50	$14.50	$12.50
Connellsville, beehive foundry	17.00	17.00	17.00	14.875
Chicago, oven foundry, ovens	20.40	20.40	20.40	19.25

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per net ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, open market, $100-$105 per gross ton. Forging quality, $50 per net ton, mill.

Alloy Steel Ingots: $51 per net ton, mill.

Rerolling Billets, Blooms, Slabs: $52 per net ton, mill, except: $62, Conshohocken, Pa.; $66. Monessen, Pa.; sales by smaller interests on negotiated basis at $85 per gross ton, or higher.

Forging Quality Billets, Blooms, Slabs: $61 per net ton, mill, except: $68, Conshohocken, Pa., mill.

Alloy Billets, Slabs, Blooms: Rerolling quality, $63 per net ton, mill except: $70, Conshohocken, Pa.

Sheet Bars: $67 nom., per net ton, mill; sales in open market $110-$115 per gross ton.

Skelp: 3.25c per lb, mill.

Tube Rounds: $76 per net ton, mill; some sellers quoting up to $120 per gross ton.

Wire Rods: Basic and acid open-hearth, 7/32 & ⅜-inch, inclusive, 3.40c per lb, mill, except: 3.65c, Struthers, O.; 3.70c, Worcester, Mass.; 4.05c, Pittsburg, Calif.; 4.10c, Portsmouth, O., Los Angeles; 4.15c Monessen, Pa. Basic open-hearth and bessemer, not resulphurized, 7/32 to 47/64-inch, inclusive, 3.50c, mill.

Bars

Hot-Rolled Carbon Bars (O.H. only; base 20 tons): 3.35c, mill, except: 3.55c, Ecorse, Mich., Pittsburgh, Monessen, Aliquippa, Pa.; 4.05c, Pittsburg, Torrance, Calif.; 4.10c, S. San Francisco, Los Angeles, Niles, Calif., Portland, Oreg., Seattle; 4.20c, Kansas City, Mo.; 4.25c, Minnequa, Colo.; 4.40c, Atlanta; 5.30c, Fontana, Calif.

Rail Steel Bars: (Base 10 tons): 3.35c, Moline, Ill., 5.10c, Williamsport, Pa.; another interest quotes 5.35c, mill.

Hot-Rolled Alloy Bars: 3.75c, mill, except: 4.05c, Ecorse, Mich.; 4.80c, Los Angeles; 5.50c, Fontana, Calif.

Cold-Finished Carbon Bars (Base 40,000 lb and over): 4.00c, mill, except: 3.95c, Pittsburgh, Cumberland, Md.; 4.20c, Indianapolis; 4.25c, Monessen, Pa.; 4.30c, Ecorse, Mich.; 4.35c, St. Louis; 4.36c, Plymouth, Mich.; 4.40c, Newark, N. J., Hartford, Putnam, Conn., Mansfield, Readville, Mass.; 4.50c, Camden, N. J.; 5.30c, Los Angeles.

Cold-Finished Alloy Bars: 4.65c, mill, except: 4.75c, Monessen, Pa.; 4.85c, Indianapolis; 4.95c, Worcester, Mansfield, Mass., Hartford.

High-Strength, Low-Alloy Bars: 5.10c, mill, except 5.30c, Youngstown; 5.40c, Ecorse, Mich.

Reinforcing Bars (New Billet): 3.35c, mill, except: 3.55c, Monessen, Pa.; 4.05c, Pittsburg, Torrance, Calif.; 4.10c, Atlanta, Seattle, S. San Francisco, Los Angeles; 4.25c, Minnequa, Colo. Fabricated: To consumers: 4.25c, mill, except: 5.00c, Seattle.

Reinforcing Bars (Rail Steel): 4.65c, Williamsport, Pa., mill; another interest quotes 5.35c, mill.

Wrought Iron Bars: Single Refined: 8.60c, (hand puddled), McKees Rocks, Pa.; 9.50c, Economy, Pa. Double Refined: 11.25c (hand puddled), McKees Rocks, Pa.; 11.00c, Economy, Pa. Staybolt: 12.75c, (hand puddled), McKees Rocks, Pa.; 11.30c, Economy, Pa.

Sheets

Hot-Rolled Sheets (18 gage and heavier): 3.25c, mill, except: 3.25-3.30c, Cleveland; 3.30c, Pittsburgh; 3.45c, Ecorse, Mich.; 3.95c, Pittsburg, Torrance, Calif.; 5.00c, Conshohocken, Pa.; 5.65c, Fontana, Calif.; 6.25c, Kansas City, Mo.

Hot-Rolled Sheets (19 gage and lighter, annealed): 4.15c, mill, except: 4.40c, Alabama City, Ala.; 4.65c, Niles, O.; 5.05c, Torrance, Calif., Kokomo, Ind.

Cold-Rolled Sheets: 4.00c, mill, except: 4.20c, Ecorse, Mich., Granite City, Ill.; 4.95c, Pittsburg, Calif.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) 4.40c, mill, except: 5.00c, Niles, O.; 5.15c, Pittsburg, Torrance, Calif.; 5.30c, Kokomo, Ind.

Galvannealed Sheets: 4.95c, mill, except: 5.05c, Indiana Harbor, Ind.; 5.55c, Niles, O.; 5.70c, Kokomo, Ind.

Culvert Sheets, No. 16 flat Copper Steel (based on 5-cent zinc): 5.00c, mill, except: 5.40c, Granite City, Ill.; 5.45c, Kokomo, Ind.; 5.75c, Pittsburg, Torrance, Calif.

Long Ternes, No. 10 (Commercial quality): 4.80c, mill.

Enameling Sheets, No. 12: 4.40c, mill, except: 4.60c, Granite City, Ill.; 4.70c, Ecorse, Mich.; 6.00c, Niles, O.

Silicon Sheets, No. 24: Field: 5.15c, mill. Armature: 5.45c, mill, except: 5.95c, Warren, O.; 6.05c, Niles, O.
Electrical: Hot-rolled, 5.95c, mill, except: 6.05c, Kokomo, Ind.; 6.15c, Granite City, Ill.; 6.45c, Warren, O.; 6.55c, Niles, O.
Motor: 6.70c mill except: 6.90c, Granite City, Ill.; 7.20c, Warren, O.
Dynamo: 7.50c, mill, except: 7.70c, Granite City, Ill.
Transformer 72, 8.05c, mill, except: 9.15c, Follansbee, W. Va., Toronto, O.; 10.05c, Brackenridge, Pa.; 65, 8.60c, mill, except: 9.85c, Follansbee, W. Va., Toronto, O.; 10.60c, Brackenridge, Pa.; 58, 9.30c, mill except: 10.55c, Follansbee, W. Va., Toronto, O.; 11.30c, Brackenridge, Pa.; 52, 10.10c, mill, except: 11.35c, Follansbee, W. Va., Toronto, O.

High-Strength Low-Alloy Sheets: Hot-rolled, 4.95c, mill, except: 5.15c, Youngstown; 5.25c, Ecorse, Mich., and Conshohocken, Pa., mills.
Galvanized (No. 10), 6.75c, mill.
Cold-rolled, 6.05c, mill, except: 6.25c, Youngstown; 6.35c, Ecorse, Mich.

Strip

Hot-Rolled Strip: 3.25c mill, except: 3.30c, Cleveland, Pittsburgh, Riverdale, Ill.; 3.25-3.35c,* Sharon, Pa.; 3.45c, Ecorse, Mich.; 3.60c, Detroit; 3.65c, Atlanta; 3.70c, West Leechburg, Pa.; 4.00c, Pittsburg, Torrance, Calif.; 4.25c, Seattle, S. San Francisco, Los Angeles; 4.20c, Kansas City, Mo.; 4.30c, Minnequa, Colo.; 5.90c Fontana, Calif. One company quotes 4.90c, Pittsburgh base.

* Wider than 6-in. and 6-in. and narrower, respectively.

Cold-Rolled Strip (0.25 carbon and less); 4.00c, mill, except 4.00-4.25c, Warren, O.; 4.00-4.50c, Youngstown; 4.20c, Ecorse, Mich.; 4.25c, Riverdale, Ill.; 4.40-4.50c, Detroit; 4.50c, New Haven, Conn., West Leechburg, New Castle, Pa., Boston; 4.75c, Dover, O., New Kensington, Pa.; 4.50-5.00c, Trenton, N. J.; 4.80-5.05c, Wallingford, Conn.; 5.75c, Los Angeles; 7.10c, Fontana, Calif. One company quotes 4.55c, Cleveland or Pittsburgh base, and 4.75c, Worcester, Mass., base; another, 5.00c, Pittsburgh base.

Cold-Finished Spring Steel: 0.26-0.40 C, 4.00c, mill, except: 4.25c, Dover, O., Chicago; 4.30c, Worcester, Mass.; 4.50c, New Castle, Pa., Boston, Youngstown; 4.75c, Wallingford, Conn. Over 0.40 to 0.60 C, 5.50c, mill, except: 5.65c, Chicago; 5.75c, Dover, O.; 5.80c, Worcester, Mass., Wallingford, Conn., Trenton, N. J.; 5.95c, Boston; 6.00c, New Castle, Pa. Over 0.60 to 0.80 C, 6.10c, mill, except: 6.25c, Chicago; 6.35c, Dover, O.; 6.40c, Worcester, Mass., Wallingford, Bristol, Conn., Trenton, N. J.; 6.60c, New Castle, Pa. Over 0.80 to 1.05 C, 8.05c, mill, except: 7.85c, Dover, O.; 8.20c, Chicago; 8.35c, Worcester, Mass., Bristol, Conn., Trenton, N. J. Over 1.05 to 1.35 C, 10.35c, mill, except: 10.15c, Dover, O.; 10.30c, Wallingford, Conn.; 10.50c, Chicago; 10.65c, Worcester, Mass., Trenton, N. J.

Cold-Rolled Alloy Strip: 9.50c, mill except: 9.80c, Worcester, Mass.

High-Strength, Low-Alloy Strip: Hot-rolled, 4.95c, mill, except: 5.15c, Youngstown; 5.25c, Ecorse, Mich., mill. Cold-rolled, 6.05c, mill, except: 6.25c, Youngstown; 6.35c, Ecorse, Mich., mill.

Tin, Terne Plate

Tin Plate: American Coke, per base box of 100 lb, 1.25 lb coating $7.50-$7.70; 1.50 lb coating $7.75-7.95. Pittsburgh, Calif., mill $8.25 and $8.50, respectively, for 1.25 and 1.50 lb coatings.

Electrolytic Tin Plate: Per base box of 100 lb, 0.25 lb tin, $6.45-6.65; 0.50 lb tin, $6.70-$6.90; 0.75 lb tin, $7.00-$7.20.

Can Making Black Plate: Per base box of 100 lb, 55 to 128 lb basis weight $5.75-$5.85. Pittsburg, Calif., mill, $6.50.

Holloware Enameling Black Plate: 29-gage, 5.30c per pound, except: 5.40c, Sparrows Point, Md.; 5.50c, Granite City, Ill.

Manufacturing Ternes (Special Coated): Per base box of 100 lb, $6.65, except: $6.75 Fairfield, Ala., Sparrows Point, Md.

Roofing Ternes: Per package 112 sheets; 20 x 28 in., coating I.C. 8-lb, $15.50.

Plates

Carbon Steel Plates: 3.40c, mill, except: 3.40-3.60c, Cleveland; 3.45c, Sparrows Point, Md., Johnstown, Pa., Lackawanna, N. Y.; 3.60c, Pittsburgh; 3.65c, Ecorse, Mich.; 3.75c, Coatesville, Pa.; 3.95c, Claymont, Del., Conshohocken, Pa.; 4.30c, Seattle, Minnequa, Colo.; 4.56c, Houston, Tex.; 5.80c, Fontana, Calif.; 6.50c, Harrisburg, Pa.; 6.25c, Kansas City, Mo.

Floor Plates: 4.55c, mill.

Open-Hearth Alloy Plates: 4.10c, mill, except: 5.10c, Coatesville, Pa., mill.

High-Strength, Low-Alloy Plates: 5.20c mill, except: 5.10c, Coatesville, Pa.; 5.30c, Conshohocken, Pa., Sparrows Point, Md., Johnstown, Pa.; 5.40c, Youngstown; 5.65c, Ecorse, Mich., Sharon, Pa.

Shapes

Structural Shapes: 3.25c, mill, except: 3.30c, Bethlehem, Pa., Lackawanna, N. Y., Johnstown, Aliquippa, Pa.; 3.85c, Torrance, Calif.; 4.15c, Minnequa, Colo.; 4.30c, Seattle, S. San Francisco, Los Angeles; 5.75c, Fontana, Calif.

Alloy Structural Shapes: 4.05c, mill.

Steel Sheet Piling: 4.05c, mill.

High-Strength, Low-Alloy Shapes: 4.95c, mill, except: 5.05c, Bethlehem, Johnstown, Pa., Lackawanna, N. Y.; 5.15c, Youngstown.

Wire and Wire Products

Wire to Manufacturers (carloads): Bright, Basic or Bessemer Wire, 4.15c, mill, except: 4.25c, Sparrows Point, Md., Kokomo, Ind.; 4.45c, Worcester, Mass.; 4.50c, Monessen, Pa.; Minnequa, Colo., Atlanta, Buffalo; 4.80c, Palmer, Mass.; 5.10c, Pittsburg, Calif.; 5.15c, S. San Francisco; 5.40c, Shelton, Conn. One producer quotes 4.15c, Chicago base; another, 4.50c, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Basic MB Spring Wire, 5.55c, mill, except: 5.65c, Sparrows Point, Md., Monessen, Pa.; 5.85c, Worcester, Palmer, Mass., Trenton, N. J.; 6.50c, Pittsburg, Calif.

Upholstery Spring Wire, 5.20c mill, except: 5.30c, Sparrows Point, Md., Williamsport, Pa.; 5.50c, Worcester, Mass., Trenton, N. J., New Haven, Conn.; 6.15c, Pittsburg, Calif.

Wire Products to Trade (carloads): Merchant Quality Wire: Annealed (6 to 8 Gage base), 4.80c, mill, except: 4.90c, Sparrows Point, Md.; 4.95c, Monessen; Pa.; 5.10c Worcester, Mass.; 5.15c, Minnequa, Colo., Kokomo, Ind.; 5.20c, Atlanta; 5.75c, S. San Francisco, Pittsburg, Calif. One producer quotes 4.80c, Chicago and Pittsburgh base; another, 5.20c, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Galvanized (6 to 8 Gage base), 5.25c, mill, except: 5.35c, Sparrows Point, Md.; 5.40c, Portsmouth, O., Aliquippa, Monessen, Pa.; 5.55c, Worcester, Mass.; 5.60c, Kokomo, Ind., Minnequa, Colo.; 5.65c, Atlata; 6.20c, Pittsburg, S. San Francisco, Calif. One producer quotes 5.25c, Pittsburgh and Chicago base; another, 5.65c, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Nails and Staples: Standard, cement-coated and galvanized nails and polished and galvanized staples, Col. 103, mill, except: 105, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 109, Worcester, Mass.; 110, Minnequa, Colo., Atlanta; 123, Pittsburg, Calif.; 124, Cleveland; 126, Monessen, Pa.; $6.75 per 100 pound keg, Conshohocken, Pa., Wheeling, W. Va. One producer quotes column 103, Chicago and Pittsburgh base; another, column 113, Crawfordsville, Ind., freight equalized with Birmingham and Pitsburgh.

Woven Fence (9 to 15½ Gage, inclusive): Col. 109, mill, except: 111, Portsmouth, O., 113, Monessen, Pa., Kokomo, Ind.; 116, Minnequa, Colo.; 121, Atlanta; 132, Pittsburg, Calif. One producer quotes Col. 109, Pittsburgh and Chicago base; another Col. 114, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Barbed Wire: Col. 123 mill, except: 125, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 126, Atlanta; 128, Monessen, Pa.; 130, Minnequa, Colo.; 143, Pittsburg, Calif.; 145, S. San Francisco. One producer quotes Col. 123, Chicago and Pittsburgh base.

Fence Posts (with clamps): Col. 114, Duluth; 115, Johnstown, Pa.; 116, Moline, Ill.; 122, Minnequa, Colo.; $123.50 per net ton, Williamsport, Pa.

Bale Ties (single loop): Col. 106, mill, except: 108, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 110, Atlanta; 113, Minnequa, Colo.; 130, S. San Francisco, Pittsburg, Calif. One producer quotes Col. 115, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Stainless Steels

(Mill prices, cents per pound)

CHROMIUM NICKEL STEELS

Type No.	Bars, Wire Shapes	Strip, Cold-Rolled	Sheets
301	28.50-28.75	30.50-32.00	37.50-40.75
302	28.50-28.75	33.00-33.75	37.50-40.75
303	31.00-31.50	36.50-39.75	39.50-43.00
304	30.00-31.25	35.00-35.75	39.50-43.00
316	46.00-48.00	55.00-57.25	53.00-57.25
321	34.00-34.75	44.50-45.75	45.50-49.00
347	38.50-39.75	48.50-50.25	50.00-54.00

STRAIGHT CHROMIUM STEELS

410	22.75-23.00	26.50-27.00	32.00-33.00
416	23.25-23.50	28.25-33.50	32.50-33.50
430	23.25-23.50	27.00-27.50	34.75-35.50
446	32.50-33.00	60.00-62.25	46.50-50.00

STAINLESS-CLAD STEELS

	Plates —Cladding—		Sheets —Cladding—	
	10%	20%	10%	20%
302	....	....	19.75	21.50
304	22.50	26.50	20.75	22.50
310	32.50	36.50	....	....
316	27.00	31.00	26.00	28.00
321	23.50	27.50	....	....
347	25.00	29.00	24.00	26.00
405	18.75	24.75	....	....
410	18.25	24.25	....	....
430	18.25	24.25	....	....

Tool Steels

Tool Steel: Cents per pound, producing plants; reg. carbon 19.00c; extra carbon 22.00c; special carbon 26.50c; oil-hardening 29.00c; high carbon-chromium 52.00c; chrome hot work, 29.00c.

W	Cr	V	Mo	Co	Base Per lb
18	4	1	...	...	90.50c
18	4	2	...	...	102.50c
18	4	3	...	...	114.50c
18	4	2	...	9	168.50c
1.5	4	1	8.5	...	65.00c
6.4	4.5	1.9	5	...	69.50c
6	4	3	6	...	88.00c

Tubular Goods

Standard Steel Pipe: Mill prices in carlots, threaded and coupled, to consumers about $200 a net ton. Discounts from base follow:

	Butt Weld			Butt Weld	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	39½- 41½	8½- 12½	1	46- 48½	25- 27½
¼	37½- 39½	9½- 14	1¼	46½- 49	25½- 28
⅜	34- 36	4½- 9	1½	47- 49½	26- 28½
½	40½- 43	18- 21½	2	47½- 50	26½- 29
¾	43½- 46	22- 24½	2½, 3	48- 50½	27- 29½
			3½ & 4	44½	22½

	Lap Weld		Elec. Weld		Seamless	
In.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
2	39½	17½	38½	16½	27- 38½	5- 17
2½	42½- 43½	20½- 21½	41½	19½	32½- 41½	10½- 20
3	42½- 43½	20½- 21½	41½	19½	35- 41½	13- 20
3½&4	42½- 46½	20½- 24½	43½	21½	38½- 43½	16½- 22
5 & 6	42½- 44½	20½- 22½	43½	21½	38½- 43½	16½- 22
7	....	....	....	....	43½	20½

Line Steel Pipe: Mill prices in carlots to consumers about $200 a net ton.

	Butt Weld			Butt Weld	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	40½	....	1¼	46- 48	26- 27
¼	38½	....			
⅜	35	....	1½	46½- 48½	26½- 27½
½	40- 42	18½- 19½	2	47- 49	26½- 28
¾	43- 45	22½- 23½	2½ & 3	47½- 49½	27- 28½
1	45½- 47½	25½- 26½	3½ & 4	43½	....

	Lap Weld		Elec. Weld		Seamless	
In.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
2	38½	16½	37½	15½	26- 37½	4- 16
2½	42½	20½	40½	19½	31½- 40½	9½- 19
3	42½	20½	40½	19½	34- 40½	12- 19
3½-4	41½- 45½	20- 23½	42½	20½	37½- 42½	15½- 21
5-& 6	41½- 43½	20	42½	20½	37½- 42½	15½- 21
8	45½	....	44½	21½- 22	40½- 44½	17½- 22
10	45	....	44	21- 21½	41½- 44	18½- 21½
12	44	....	43	20	40½- 43	17½- 20½

Standard Wrought Iron Pipe: Mill price in carlots, threaded and coupled, to consumers about $200 a net ton.

	Butt Weld			Lap Weld	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅜	+59½	+95½	1¼	+22	+53
½	+20½	+52½	1½	+15½	+45½
¾	+10½	+41½	2	+ 7½	+36½
1 and 1¼	+ 4½	+32½	2½-3½	+ 5	+32
1½	— 1½	+29	4½-8	+ 2	+27½
2	— 2	+28½	9-12	+12	+37

Boiler Tubes: Net base c.l. prices, dollars per 100', mill minimum wall thickness, cut lengths 4 to 24', inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	.....	13.39-14.64	13.00	13.00
1¼	13	.....	15.87-17.34	13.21	15.39
1½	13	16.45	17.71-19.35	14.60	17.18
1¾	13	18.71	20.15-22.02	16.60	19.54
2	13	20.96	22.56-24.66	18.60	21.89
2¼	13	23.36	25.16-27.50	20.73	24.40
2½	12	23.54-25.73	27.70-30.28	22.83	26.88
2½	12	25.79-28.19	30.33-33.15	25.02	29.41
2¾	12	27.33-29.87	32.14-35.13	26.51	31.18
3	12	28.68-31.35	33.76-36.90	27.82	32.74
3¼	11	33.39-36.50	38.29-42.95	32.39	38.11
3½	11	35.85-39.19	42.20-46.13	34.78	40.94
4	10	44.51-48.65	52.35-57.22	43.17	50.78
4½	9	58.99-64.47	69.42-75.88	....	....
5	9	68.28-74.64	80.35-87.82	....	....
6	7	104.82-114.57	123.33-134.81	....	....

Pipe Cast Iron: Class B, 6-in. and over, $98.50 per net ton, Birmingham; $106.70, del. Chicago; 4-in. pipe, $5 higher; Class A pipe, $5 a ton over Class B.

Rails, Supplies

Rails: Standard, over 60-lb; $3.20 per 100 lb mill, except: $3.50, Indiana Harbor, Ind., and Minnequa, Colo.

Light (billet): $3.55 per 100 lb, mill, except: $4.25, Minnequa, Colo.

Light (rail steel): $5.10 per 100 lb, Williamsport, Pa.

Railroad Supplies: Track bolts, treated: $8.50 per 100 lb, mill. Untreated: $8.25, mill.

Tie Plates: 4.05c mill, except: 4.20c, Pittsburg, Torrance, Calif.; 4.50c, Seattle.

Splice Bars: 4.25c, mill.

Standard Spikes, 5.35c, mill, except: 5.25c, Pittsburgh.

Axles: 5.20c, mill.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

Per gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., furnace	$48.00	$48.50	$49.00	$49.50
Newark, N. J., del.	50.5334	51.0334	51.5334	52.0334
Brooklyn, N. Y., del.	....	52.634	53.134	....
Philadelphia, del.	50.3002	50.8002	51.3002	51.8002
Birmingham, furnace	42.88	43.38	....	....
Cincinnati, del.	....	49.43	....	....
Buffalo, furnace	47.00	47.00	47.50	48.00
Boston, del.	56.20	56.20	56.70	....
Rochester, del.	49.35	49.35	49.85	50.35
Syracuse, del.	50.2065	50.2065	50.7065	41.2065
§Chicago, district furnaces ..	46.00	46.00-46.50	46.50	47.00
Milwaukee, del.	47.82	47.82-48.32	48.32	48.82
Muskegon, Mich., del.	....	51.28-51.78	51.78	....
Cleveland, furnace	46.00	46.50	46.50	47.00
Akron, del.	48.3002	48.8002	48.8002	49.3002
Lone Star, Tex., furnace....	50.00	†50.50	....	....
Duluth, furnace	....	46.50	46.50	47.00
Erie, Pa., furnace	46.00	46.50	46.50	47.00
Everett, Mass., furnace	....	52.75	53.25	....
Geneva, Utah, furnace	46.00	46.50	....	....
Seattle, Tacoma, Wash., del.	....	54.0578	....	....
Portland, Oreg., del.	....	54.0578	....	....
Los Angeles, San Francisco	53.5578	54.0578	....	....
Granite City, Ill., furnace....	47.90	48.40	48.90	....
St. Louis, del.	49.40	49.90	50.40	....
Ironton, Utah, furnace	55.00	55.50	....	....
‡Neville Island, Pa., furnace.	46.00	46.50	46.50	47.00
Pittsburgh, del., N.&S. Sides	47.08	47.58	47.58	48.08
Pittsburgh (Carnegie), furnaces	46.00	....	....	47.00
Sharpsville, Pa., furnace	46.00	46.50	46.50	47.00
Steelton, Pa., furnace	48.00	48.50	49.00	49.50
Struthers, O., furnace	46.00	....	....	....
Swedeland, Pa., furnace	50.00	50.50	51.00	....
Toledo, O., furnace	46.00	46.50	46.50	47.00
Cincinnati, del.	50.8230	51.3230	....	....
Youngstown, O., furnace	46.00	46.50	46.50	47.00
Mansfield, O., del.	50.1022	50.6022	50.6022	51.1022

† Low phosphorus southern grade.

‡ To Neville Island base add: $0.86 for McKees Rocks, Pa.; $1.31 Lawrenceville, Homestead, McKeesport, Monaca; $1.73 Verona; $1.94 Brackenridge; $1.08 for Ambridge and Aliquippa.

§ Includes, in addition to Chicago, South Chicago, Ill., East Chicago, Gary and Indiana Harbor, Ind.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent Si (base) .$59.50
6.51-7.00.. 60.75 9.01- 9.50. 67.00
7.01-7.50.. 62.00 9.51-10.00. 68.25
7.51-8.00.. 63.25 10.01-10.50. 69.50
8.01-8.50.. 64.50 10.51-11.00. 70.75
8.51-9.00.. 65.75 11.01-11.50. 72.00
F.o.b. Jackson, O., per gross ton. Buffalo furnace $1.25 higher.

Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron Si 14.01-14.50%, $84.75 furnace, Niagara Falls; $84 open-hearth and $85 foundry grade, Keokuk, Iowa. Piglets, Si 16%, $91, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 a ton for 0.45% max. P.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. F.o.b. furnace, Lyles, Tenn....$66 (For higher silicon iron a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Low Phosphorus

Steelton, Pa., Troy, N. Y., $54; Philadelphia, $56.9786 del. Intermediate phosphorus, Central furnace, Cleveland, $51.

Electrodes

(Threaded, with nipples, unboxed)

——Inches—— Diam.	Length	Cents per lb, f.o.b. plant
	Graphite	
17, 18, 20	60, 72	16.00
8 to 16	48, 60, 72	16.50
7	48, 60	17.75
8	48, 60	19.00
4, 5⅛	40	19.50
3	40	20.50
2½	24, 30	21.00
2	24, 30	23.00
	Carbon	
40	100, 110	7.50
35	100, 110	7.50
30	84, 110	7.50
24	72 to 104	7.50
17 to 20	84, 90	7.50
14	60, 72	8.00
10, 12	60	8.25
8	60	8.50

Fluorspar

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34.

Metallurgical Coke

Price per Net Ton

Beehive Ovens	
Connellsville, furnace..	$13.50-15.50
Connellsville, foundry..	16.00-18.00
New River, foundry ...	16.50
Wise county, foundry..	15.35
Wise county, furnace..	14.60
Oven Foundry Coke	
Kearney, N. J., ovens.	$22.00
Everett, Mass., ovens. New England, del.‡.	23.35
Chicago, ovens	20.40
Chicago, del.	†21.85
Detroit, del.	24.16
Terre Haute, ovens....	20.20
Milwaukee, ovens	21.15
Indianapolis, ovens ...	20.85
Chicago, del.	24.19
Cincinnati, del.	23.66
Detroit, del.	24.61
Ironton, O., ovens	19.40
Cincinnati, del.	21.63
Painesville, O., ovens..	20.90
Buffalo, del.	23.42
Cleveland, del.	22.55
Erie, del.	22.70
Birmingham, ovens ..	17.70
Philadelphia, ovens ...	21.05
Swedeland, Pa., ovens.	21.00
Portsmouth, O., ovens.	19.50
Detroit, ovens	20.65
Detroit, del.	•21.70
Buffalo, del.	22.75
Flint, del.	22.98
Pontiac, del.	21.98
Saginaw, del.	23.30

Includes representative switching charge of: *, $1.05; †, $1.45. ‡ Or within $4.03 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens (Price effective as of Aug. 5)

Pure benzol	20.00
Toluol, one degree	20.50-26.50
Toluol, two degrees ...	23.00-26.50
Industrial xylol	20.50-26.50
Per ton bulk, ovens	
Sulphate of ammonia	$45.00
Per pound, ovens (Effective as of Oct. 1)	
Phenol, 40 (carlots, returnable drums)	13.50
Do., less than carlots	14.25
Do., tank cars	12.50
(Effective as of Oct. 25)	
Naphthalene flakes, balls, bbl to jobbers, "household use"	13.75

Refractories

(Prices per 1000 brick, f.o.b. plant)

Fire Clay Brick

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., Ottawa, Ill., $100. Hard-fired, $135 at above points.

High-heat Duty: Salina, Pa., $85; Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Ahtens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., Ottawa, Ill., $80.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $74.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Besemer, Ala., Ottawa, Ill., $66.

Ladle Brick

Dry Press: $55, Freeport, Merill Station, Clearfield, Pa.; Chester, New Cumberland, W. Va.; Irondale, Wellsville, O.

Wire Cut: $53, Chester, New Cumberland, W. Va.; Wellsville, O.

Malleable Bung Brick

St. Louis, Mo., Olive Hill, Ky., Ottawa, Ill., $90; Beach Creek, Pa., $80.

Silica Brick

Mt. Union, Claysburg, or Sproul, Pa., Ensley, Ala., $80; Hays, Pa. $85; Joliet or Rockdale, Ill., E. Chicago, Ind., $89; Lehi, Utah, Los Angeles, $95.

Eastern Silica Coke Oven Shapes: Claysburg, Mt. Union, Sproul, Pa., Birmingham, $80.

Illinois Silica Coke Oven Shapes: Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $81.

Basic Brick

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite, $80.

Magnesite

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅜" grains; Bulk, $30.50-31.00; single paper bags, $35.00-35.50.

Dolomite

(Base prices per net ton)

Domestic, dead-burned bulk: Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Nario, Millersville, Martin, Gibonsburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (natural)

Lower Lake Ports

(Any increase or decrease in R.R. freight rates, dock handling charges and taxes thereon effective after Dec. 31, 1948, are for buyer's account.)

Old range bessemer	$7.60
Old range nonbessemer	7.45
Mesabi bessemer	7.35
Mesabi nonbessemer	7.20
High phosphorus	7.20

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56.62% concentrates, contract	16.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68% ..	15.00
Brazil iron ore, 68-69%	19.50

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid	$26–$28

Manganese Ore

48-50%, duty paid, f.o.b. cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 67.60c-72.60c.

Chrome Ore

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S.C., plus ocean freight differential for delivery to Portland, Oreg., and/or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	37.50
48% 3:1	39.00
48% no ratio	31.00
South African (Transvaal)	
44% no ratio .....$25.50-$26.00	
45% no ratio	26.50
48% no ratio 29.00-30.00	
50% no ratio 29.50-30.50	
Brazilian—nominal	
44% 2.5:1 lump	$33.65
Rhodesian	
45% no ratio .....$27-$27.50	
48% no ratio	30.00
48% 3:1 lump	39.00
Domestic (seller's nearest rail)	
48% 3:1	$39.00

Molybdenum

Sulphide conc., lb, Mo., cont., Mines	$0.90

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras.

	SHEETS			STRIP		BARS				PLATES	
	H-R 10 Ga.	C-R 17 Ga.	Gal. *10 Ga.	†H-R	†C-R	H-R Rds. ⅝" to 3"	C-F Rds. ½" & up	H-R Alloy **4140	Standard Structural Shapes	Carbon ⅜"-¾"	Floor ⅜" & Thicker
New York (city)	5.80	6.76	7.91	5.92	...	5.80	6.61	8.68	5.53	5.90	7.51
New York(c'try)	5.60	6.56	7.71	5.72	...	5.60	6.41	8.48	5.33	5.70	7.31
Boston (city) ..	6.10	6.70	8.00	6.10	...	5.67	6.42	8.72	5.57	5.95	7.40
Boston (c'try) .	5.95	6.55	7.85	5.95	...	5.52	6.27	8.57	5.42	5.80	7.25
Phila. (city)...	5.72	6.64	7.53-7.58	5.60	...	5.55	6.34	8.40	5.25	5.53	6.74
Phila. (c'try)..	5.57	6.59	7.38-7.43	5.45	...	5.40	6.19	8.25	5.10	5.38	6.59
Balt. (city) ...	5.46†	6.36	7.26	5.52	...	5.57	6.31	...	5.51	5.71	7.16
Balt. (c'try)...	5.31†	6.21	7.11	5.37	...	5.42	6.16	...	5.36	5.56	7.01
Norfolk, Va. ..	5.80	...	...	...	...	6.05	7.05	...	6.05	6.05	7.55
Wash. (w'hse).	5.84-6.00	...	...	5.90	...	5.91-5.95	6.61	...	5.85-5.89	6.05-6.09	7.50-7.54
Buffalo (del.)..	5.00	5.90	7.85	5.49	6.50	5.20	6.05	10.13	5.25	5.50	7.06
Buffalo (w'hse)	4.85	5.75	7.70	5.34	6.35	5.05	5.90	9.98	5.10	5.35	6.91
Pitts. (w'hse)..	4.85-4.90§	5.75[8]	7.15	5.00-5.10	6.00	4.90-5.10	5.65	9.60	4.90-5.15	5.05-5.25	6.55
Detroit (w'hse).	4.85-5.00§	5.75-5.85[8]	7.15	5.00-5.35	5.95-6.00	5.45	6.17	8.12	5.45	5.65-5.80	7.10
Cleveland (del.)	5.13-5.90‡‡	5.90-6.31	7.40-8.10‡‡	5.18-5.31	6.40-6.65	5.32-5.36	6.05	8.24-8.40	5.35-5.62	5.52-5.56	6.95-7.01
Cleve. (w'hse).	4.98-5.75	5.75-6.16	7.25-7.95	5.03-5.16	6.25-6.50	5.17-5.21	5.90	8.24-8.25	5.21-5.47	5.37-5.41	6.80-6.86
Cincin. (w'hse).	5.29	6.14	7.63	5.55	6.10	5.55	6.10	...	5.40	5.64	6.94
Chicago (city).	5.20	5.90‡[8]	7.30	5.00	6.67-6.80	5.05	5.85	8.25[9]	5.05	5.25	6.70
Chicago (w'hse)	4.85-5.05	5.75‡[8]	7.15	4.85	6.52-6.65	4.90	5.70	8.10[9]	4.90	5.10	6.55
Milwaukee(city)	5.38	6.08‡[8]	7.48	5.18	6.82-6.98	5.23	6.03	8.43[9]	5.23	5.43	6.88
St. Louis (del.)	5.34§	6.24[8]	7.44	5.34	6.64	5.39	6.19[12]	6.64	5.39	5.59	7.04
St. L. (w'hse).	5.19§	6.09[8]	7.29	5.19	6.49	5.24	6.04[12]	9.49	5.24	5.44	6.89
Birm'ham (city)	5.20§	...	6.60	5.20	...	5.15	6.66-6.83	...	5.15	5.40	7.41-7.73[20]
Birm'ham(c'try)	5.05§	...	6.45	5.05	...	5.00	6.51-6.68	...	5.00	5.25	7.26-7.58[20]
Omaha, Nebr...	6.07	...	9.33	6.07	...	6.12	6.92	...	6.12	6.32	7.77
Los Ang. (city)	6.60§	8.05	8.90†	6.80	9.50	6.25	8.20	...	6.10	6.30	8.20
L. A. (w'hse) .	6.45§	7.90	8.75†	6.65	9.35	6.10	8.05	...	5.95	6.15	8.05
San Francisco..	5.95[21]	7.15	8.05	6.75[21]	8.25[18]	5.90[21]	7.55	10.20‡‡	5.90	7.60	8.10
Seattle-Tacoma.	6.35[17]	7.90[8]	8.40	6.70[17]	...	6.20[17]	8.15[4]	9.45[2]	6.30[17]	6.35[17]	8.40[17]

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold finished bars, 1000 lb and over; galvanized sheets, 450 to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [3]—450 to 39,999 lb; [4]—three to 24 bundles; [5]—450 to 1499 lb; [6]—400 to 14,999 lb; [8]—400 to 1499 lb; [9]—1000 to 1999 lb; [11]—1000 to 39,999 lb; [12]—1000 lb and over; [18]—2000 lb and over; [17]—300 to 999 lb; [18]—1500 to 1999 lb; [19]—1500 to 39,999 lb; [20]—400 to 3999 lb; [21]—400 lb and over; [22]—500 to 1499 lb; [23]—Price (but not other price in range) applies to any and all quantities.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; § 18 gage and heavier; ** as rolled; †† add 0.40 for sizes not rolled in Birmingham; ‡‡ top level of quoted range is nominal.

Bolts, Nuts

Prices to consumers, f.o.b. midwestern plants. Sellers reserve right to meet competitors' prices, if lower. Additional discounts on carriage and machine bolts, 5 for carloads; 15 for full containers, except tire and plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length	35 off
⅝ and ⅝ x 6-in. and shorter	37 off
¾-in. and larger x 6-in. and shorter..	34 off
All diameters longer than 6-in.	30 off
Tire bolts	25 off
Plow bolts	47 off
Lag bolts, 6 in. and shorter	37 off
Lag bolts, longer than 6 in.	35 off

Stove Bolts

In packages, nuts separate, 58½-10 off; bulk 70 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts

Semifinished hexagon	A.S. f.o.b. A.S. Reg. and Light	Heavy
⅛-in. and smaller	41 off	.....
½-in. and smaller	.....	38 off
⅛-in.-1-in.	39 off	.....
⅛-in.-1-in.	.....	37 off
1⅛-in.-1½-in.	37 off	35 off
1⅝-in. and larger	34 off	28 off

Additional discount of 15 for full containers.

Hexagon Cap Screws (Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright)	46 off
Upset (1035 heat treated)	
⅝ and smaller x 6 and shorter	40 off
⅞, 1⅛, & 1 x 6-in. and shorter	35 off

Square Head Set Screws

Upset 1-in. and smaller	51 off
Headless, ¼-in. and larger	31 off

Rivets

F.o.b. midwestern plants

Structural ½-in. and larger	6.75c
⅛-in. and under	48 off

Washers, Wrought

F.o.b. shipping point, to jobbers..Net to $1 off

FERROALLOY PRODUCT PRICES

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si) Carlot per gross ton, $62, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $160 per gross ton of alloy, c.l., packed, $172; gross ton lots, packed, $187; less gross ton lots, packed, $204; f.o.b. *Alloy, W. Va., *Niagara Falls, N. Y., or Welland, Ont. Base Price: $165, Rockwood, Tenn.; $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $160, *Sheridan, Pa.; $163,* Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $31 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $201; less gross ton lots, $218 f.o.b. Chicago. Add or subtract $2 for each 1%, or fraction thereof, of contained manganese over 82% and under 78%, respectively.

* Contract price with spot $12 higher. Effective Apr. 1, contract price will be same as spot at Alloy, W. Va., Niagara Falls, N. Y., Welland, Ont., Sheridan, and Etna, Pa.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P. 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c, Delivered. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload, 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

Manganese, Electrolytic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, F.o.b. cars Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.6c per lb of alloy, carload packed, 9.35c, ton lot 10.25c, less ton 11.25c. Freight allowed. For 2% C grade, Si 15-17.5%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c- 28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lot 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max. 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

(*Please turn to Page* 172)

Lead Demand Continues Weak

One producer makes second price cut within a week, dropping 1.50c, but action fails to stimulate buying as consumers work off inventories or buy only for immediate use

New York—The lead market was marked with price confusion last week as American Smelting & Refining Co. announced the second price cut within a week, while the St. Joseph Lead Co. price remained unchanged.

The latest move by A. S. & R. cut the price of common lead from 19.50c at New York to 18.00c. A week earlier the price had been 21.50c, an alltime high.

Price quoted by St. Joseph continued at 19.30c, St. Louis. That company has made one price reduction, 2.00c, effective Mar. 8.

The drop-off in demand for lead, which brought about the first cut in price Mar. 8, is of such magnitude that the second reduction by A. S. & R. is reported to have generated no spurt in buying, consumers appearing to be intent on reducing inventories still further or limiting purchases to those for prompt shipment in order to keep purchases as close as possible to actual requirements. Some observers do not expect any strengthening in demand until after Apr. 1.

After A. S. & R. cut its price on common lead to 18.00c, a leading producer of lead products and oxides lowered its prices on these items.

Lead scrap continues in light demand, and smelters have cut their prices for clean, heavy material to 13.00c, a drop of 8.00c from that of three months ago.

Copper Scrap Prices Decline

New York — Although producers of primary copper reported domestic demand for March and April delivery is so strong that supply of the refined metal must be allocated, the offerings of copper scrap to refineries have increased to such an extent that custom smelters have lowered their buying prices as much as 1.00c a pound, while other custom smelter buyers have withdrawn from the market.

Principal reason for the drop in the price of copper scrap, according to one refiner, is the inability to sell refined copper for July delivery. Because this situation makes it impossible to determine what the copper price may be in July, custom smelters are protecting themselves by lowering the buying price on scrap and committing themselves for no scrap that cannot be delivered within the next 30 days.

New buying price for No. 1 copper wire scrap was 18.00c delivered to refinery, 17.00c for No. 2 copper wire, and 16.00c for light copper scrap.

Scrap intake of the custom units in the first two months of 1949 was heavy, totaling 33,714 tons, or an average of 16,857 tons a month. During 1948, custom intake of scrap copper averaged 10,868 tons a month.

Refined copper production in the United States in February totaled 80,275 net tons, compared with 78,298 tons in January, according to the Copper Institute, New York. Deliveries to customers increased to 98,611 tons, from 96,070 tons in February. Refined stocks at the end of February had decreased to 83,841 tons, from 91,053 tons at the end of January.

Zinc—The zinc trade believed last week there was little to indicate any weakening soon in the zinc price structure, such as occurred in the lead market. However, the slab zinc market was quiet, there being no great consumer buying pressure.

A new report from the U. S. Bureau of Mines shows domestic mine production of recoverable zinc in 1948 declined to 621,517 net tons, 3 per cent below the 1947 output of 637,608 tons. The production figures include zinc recovered as zinc pigments and salts directly from ore.

At the average weighted yearly price of $0.133 per pound, the 1948 domestic mine output was valued at $165,323,522, compared with a value of $154,301,136 in 1947, when the average weighted price was $0.121.

Regionally, the greatest production decline was recorded in Arkansas, Kansas, Missouri and Oklahoma where the combined 1948 output was 22 per cent under the 1947 output. Zinc production in the Tri-State (Joplin) district was the lowest since 1896. Combined production in states east of the Mississippi river also dropped below that of 1947. Nearly offsetting these declines, however, was an 11,455-ton gain in zinc output in the combined Western States area which boosted production in that district to the highest level on record.

Tin—Applications for authority to import tin-bearing alloys into the United States during the second quarter must be on file by Mar. 31, the Department of Commerce announced. Total imports of contained tin are still restricted to 250 tons per quarter.

Special restrictions on amount of tin which may be used in manufacture of beer and animal food cans were removed last week by the Department of Commerce. However, tin supplies are not expected to be sufficient in the near future to meet unrestricted levels of domestic demand without seriously interfering with attainment of stockpiling goals, according to Secretary of Commerce Charles Sawyer. These goals could be met, he said, only by forcing government stockpiling authorities to bid against industry for the available supply.

The British Ministry of Supply is reported maintaining its buying price of tin at £554 per ton at Singapore and Penang until June 30. After that date, the price will depend almost entirely on the United States stockpiling policy.

Aluminum—For the third consecutive month, shipments of aluminum sheet, strip and plate shipments by members of the Aluminum Association declined in January. Those members account for more than 98 per cent of the production of these products in the United States.

January shipments totaled 88,701,266 pounds, compared with 93,031,446 pounds in December and 108,405,430 in January, 1948. Also, January shipments were lower than in any 1948 month.

Platinum — Indications of a possible price decline on platinum are appearing. A marked weakness has developed in the market and it is reported some quantities are available under the official price of $78-81 per ounce. The weakness is even more pronounced in 10 per cent iridium-platinum, it being reported the alloy is available for as much as $8 under the official price of $84. If the leading refiner continues its recent practice of lowering its price after metal becomes available under the official level, another price reduction would be in prospect. The current official price is at the lowest level in about a year.

To Utilize Lower Grade Ores

Copper Cliff, Ont.—Heavy demands on ore reserves during and since the war have influenced International Nickel Co. of Canada Ltd. to embark on a mine development program that will make possible the economic recovery and use of lower grade underground ores.

The program, which will include improved mining, concentrating and smelting methods, will account substantially for capital expenditures of approximately $18 million in 1949. In 1948, capital expenditures totaled $14,080,479, compared with $9,568,796 in 1947. During 1948, the items of larger importance were $4,542,914 on the mines and $5,066,403 on the new process plant at Copper Cliff for production of nickel in the form of nickel oxide sinter for the market and for intermediate refinery products. This plant is now completed and in operation.

Reports on Lead-Zinc Deposit

Washington—Results of an investigation conducted by the U. S. Bureau of Mines on a lead-zinc deposit in Blair County, Pa., are described in a new publication. As part of a general investigation of old and abandoned lead-zinc mines, the bureau in 1944 explored the Albright Farm deposit in Blair county, Pa., by surface trenching. The investigation was continued in 1947 when three holes were diamond-drilled on the property. Although the surface-trenching operations uncovered two additional small veins, the diamond drilling failed to discover any significant lead-zinc mineralization.

NONFERROUS METAL PRICES

(Cents per pound, carlots, except as otherwise noted)

Copper: Electrolytic, 23.50c, Conn. Valley; Lake, 23.62½c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 18.00-20.00c; 88-10-2 (No. 215) 29.50c; 80-10-10 (No. 305) 25.25c; No. 1 yellow (No. 405) 15.75-17.00c.

Zinc: Prime western 17.50c, brass special 17.75c, intermediate 18.00c, East St. Louis; high grade 18.50c, delivered.

Lead: Common 17.85-19.30c, chemical and corroding 17.90-19.40c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloy (6-6 type) 20.50-21.00c; No. 12 foundry alloy (No. 2 grade) 19.75-20.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 21.50-22.00c; grade 2, 20.50-21.00c; grade 3, 19.50-20.00c; grade 4, 18.50-19.00c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A, 99.8% or higher (including Straits) $1.03; grade B, 99.8% or higher, not meeting specifications for grade A, with 0.05% max. arsenic, $1.028; grade C, 99.65-99.79%, incl., $1.024; 99.5-99.649% $1.024, grade F, 98-98.999% $1.015 for tin content. Prices are ex-dock, New York, in 5-ton lots.

Antimony: American 99-99.8% and over but not meeting specifications below, 38.50c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 39.00c, f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $88-$94 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.10.

Cobalt: 97-98%, $1.65 per lb for 550 lb (keg); $1.67 per lb for 100 lb (case); $1.72 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 71.50c per ounce.

Platinum: $78-81 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100-$110 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

Sheet: Copper 37.18; yellow brass 34.58; commercial bronze, 95%, 37.23; 90%, 36.88; red brass, 85%, 36.01; 80%, 35.66; best quality, 35.33; nickel silver, 18%, 46.92; phosphor-bronze, grade A, 5%, 56.05.

Rods: Copper, hot rolled 36.53; cold drawn 34.28; yellow brass, free cutting, 29.24; commercial bronze, 95% 36.92; 90% 36.57; red brass, 85% 35.70; 80% 35.35.

Seamless Tubing: Copper 37.22; yellow brass 37.59; commercial bronze 90% 39.54; red brass 85% 38.92; 80% 38.57.

Wire: Yellow brass 34.87; commercial bronze, 95% 37.52; 90% 37.17; red brass, 85% 36.30; 80% 35.95; best quality brass 35.62.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 29.42½c, l.c.l. 29.92-30.05c; weatherproof, f.o.b. eastern mills, c.l. 29.60-29.85c, l.c.l. 30.35c; magnet, delivered, c.l. 32.75-33.50c, 15,000 lb or more 33.00-33.75c, l.c.l. 33.50-34.25c.

ALUMINUM

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-20	36.8	33.4	39.5
0.008-0.0075	12-20	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	—Hexagonal— R317-T4	—Hexagonal— 17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	37.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $23.00 per cwt.; add 50c per cwt., 10 sq ft to 140 sq ft. Pipe: Full coils, $23.00 per cwt; cut coils, $23.00. Traps and Bends: List price plus 60%.

ZINC

Sheets, 22.00c, f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 20.75-21.50c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 19.75-20.50c; over 12-in., 20.75-21.50c.

NICKEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill.)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c, Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb. 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

Plating Materials

Chromic Acid: 99.9%, flake, f.o.b. Philadelphia, carloads, 26.00c; 5 tons and over 26.50c; 1 to 5 tons, 27.00c; less than 1 ton, 27.50c.

Copper Anodes: Base, 2000 to 5000 lb; f.o.b. shipping point, freight allowed: Flat untrimmed 33.84c; oval 33.34c; electrodeposited, 31.09c; cast, 30.12c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 48.00c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,900 lb, 17.00c, f.o.b. Niagara Falls, N. Y.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 26.25c; over 250 lb, 25.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 10 lb, 64.00c; f.o.b. Cleveland. Add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbl, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over 119.00c; 500 to 999 lb, 119.50c; 200 to 499 lb, 120.00c; less than 200 lb, 121.50c; ball, 1000 lb and over, 121.25c; 500 to 999 lb, 121.75c; 200 to 499 lb, 122.25c; less than 200 lb, 123.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 71.8c; 100 or 300 lb drums only, 100 to 500 lb, 63.6c; 600 to 1900 lb, 61.2c; 2000 to 9900 lb, 59.4c. Prices f.o.b Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 42.50c, f.o.b. Cleveland; 43.00c, Detroit; 42.00c, f.o.b. Philadelphia.

Stannous Sulphate: Less than 2000 lb in 100 lb kegs, 100.00c, in 400 lb bbl, 99.00c; more than 2000 lb, in 100 lb kegs, 99.00c, in 400 lb bbl, 98.00c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 97.00c; in 100 lb kegs, 98.00c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	21.125	21.125	20.375
Yellow brass	18.875	18.625	18.125
Commercial Bronze			
95%	20.250	20.000	19.500
90%	20.125	19.875	19.375
Red Brass			
85%	20.000	19.750	19.250
80%	19.875	19.625	19.125
Best Quality (71-79%)	19.750	19.500	19.000
Muntz Metal	18.250	18.000	17.500
Nickel, silver, 10%	20.250	20.250	10.125
Phos. bronze, A	22.625	22.375	21.375
Naval brass	18.750	18.500	18.000
Manganese bronze	18.750	18.500	17.875

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, f.o.b. shipping joint, carload lots)

No. 1 copper 17.50-18.00, No. 2 copper 16.50-17.00, light copper 15.50-16.00, composition red brass 13.25-13.50, auto radiators 11.00-11.50, heavy yellow brass 10.25-10.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 17.50-18.00, No. 2 copper 16.50-17.00, light copper 15.50-16.00, refinery brass (60% copper), per dry copper content 15.00-16.00.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 16.00-16.25, No. 2 15.00-15.25, light copper 14.00-14.25, No. 1 composition red brass 11.75-12.00, No. 1 composition turnings 11.25-11.50, mixed brass turnings 8.00-8.25, new brass clippings 15.25-15.75; No. 1 brass rod turnings 9.00-9.25, light brass 6.50-6.75, heavy yellow brass 9.00-9.25, new brass rod ends 11.75-12.25, auto radiators, unsweated 9.75-10.00, cocks and faucets 9.75-10.00 brass pipe 10.25-10.50.

Lead: Heavy 10.50-11.00, battery plates 5.00-5.50, linotype and stereotype 15.00-15.50, electrotype 12.00-12.50, mixed babbit 14.50-15.00 solder joints, 17.50-18.00.

Zinc: Old zinc 7.50-8.00, new die cast scrap 7.50-8.00, old die cast scrap 4.50-5.00.

Tin: No. 1 pewter 64.00-66.00, block tin pipe 82.00-83.00, No. 1 babbitt 48.00-50.00, siphon tops 49.00-51.00.

Aluminum: Clippings 2S 12.00-12.50, old sheets 8.00-8.50, crankcase 8.00-8.50, borings and turnings 4.00-4.50, pistons, free of struts, 8.00-8.50.

DAILY PRICE RECORD

	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Feb. Avg.	23.50	21.235	17.50	103.00	17.00	38.50	40.00	70.838
Jan. Avg.	23.50	21.325	17.50	103.00	17.00	38.50	40.00	70.00
Mar. 1-7	23.50	21.30–21.35	17.50	103.00	17.00	38.50	40.00	71.50
Mar. 8-12	23.50	19.30–19.35	17.50	103.00	17.00	38.50	40.00	71.50
Mar. 14-17	23.50	17.85-19.30	17.50	103.00	17.00	38.50	40.00	71.50

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery, unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Hvy. Melt.	$37.00
No. 2 Hvy. Melt.	35.00
No. 1 Busheling	37.00
No. 1 Bundles	37.00
No. 2 Bundles	32.00
No. 3 Bundles	31.00
Heavy Turnings	30.00-31.00
Machine Shop Turnings	23.00-24.00*
Mixed Borings, Turnings	23.00-24.00*
Short Shovel Turnings.	27.50-28.00
Cast Iron Borings	24.00-25.00*
Bar Crops and Plate	39.50-40.00
Low Phos. Steel	39.50-40.00

Cast Iron Grades†

Mixed Yard	35.50-38.00
No. 1 Machinery Cast.	43.00-44.00
Charging Box Cast	41.00-42.00
Heavy Breakable Cast.	34.00-35.00
Brake Shoe	39.00-41.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00-40.00
Axles	44.00-46.00
Rails, Random Lengths	38.00-40.00*
Rails, 2 ft and under.	45.00-46.00
Rails, 18 in. and under	46.00-47.00
Railroad Specialties	42.00-45.00
Angles, Splice Bars	41.00-42.00

* Brokers' buying prices.
† Nominal.

CLEVELAND

No. 1 Heavy Melt. Steel	$35.00-35.50
No. 2 Heavy Melt. Steel	31.50†
No. 1 Busheling	35.00-35.50
No. 2 Bundles	29.50†
Machine Shop Turnings	21.00†
Mixed Borings, Turnings	25.00-25.50
Short Shovel Turnings.	25.00-25.50
Cast Iron Borings	25.00-25.50
Bar Crops and Plate	37.00-37.50
Punchings & Plate Scrap	37.00-37.50
Cut Structurals	39.50-40.00

Cast Iron Grades

No. 1 Cupola	42.00-44.00
Charging Box Cast	40.00-42.00
Stove Plate	38.00-40.00
Heavy Breakable Cast.	34.00-35.00
Unstripped Motor Blocks	34.00-35.00
Malleable	38.00†
Brake Shoes	35.00-35.50
Clean Auto Cast	45.00-45.50
No. 1 Wheels	40.00-41.00
Burnt Cast	33.00-34.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	39.00-39.50
R.R. Malleable	38†
Rails, 3 ft and under.	48.00-50.00
Rails, Random Lengths	42.00-44.00
Cast Steel	41.00-42.00
Railroad Specialties	41.00-42.00
Uncut Tires	40.00-42.00
Angles, Splice Bars	44.00-45.00

† Nominal.

VALLEY

No. 1 Heavy Melt. Steel	$37.00-37.50
No. 2 Heavy Melt. Steel	34.50-35.00
No. 1 Bundles	33.00
No. 2 Bundles	32.50-33.00
Machine Shop Turnings	21.00-23.00
Short Shovel Turnings	24.00-25.00
Cast Iron Borings	24.00-25.00
Low Phos.	40.00-41.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	39.50-40.00

MANSFIELD

Machine Shop Turnings	$25.00-25.50
Short Shovel Turnings.	26.00-26.50

CINCINNATI

No. 1 Heavy Melt. Steel	$30.00
No. 2 Heavy Melt. Steel	30.00
No. 1 Busheling	30.00
Nos. 1 & 2 Bundles	30.00
Machine Shop Turnings	20.00
Mixed Borings, Turnings	20.00
Short Shovel Turnings.	21.00
Cast Iron Borings	21.00

Cast Iron Grades

No. 1 Cupola Cast	42.00
Charging Box Cast	35.00
Heavy Breakable Cast.	35.00
Stove Plate	35.00
Unstripped Motor Blocks	30.00
Brake Shoes	32.00
Clean Auto Cast	42.00
Drop Broken Cast	45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.00
R.R. Malleable	35.00
Rails, Rerolling	43.00
Rails, Random Lengths	36.00
Rails, 18 in. and under	46.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	$29.50-30.00
No. 1 Busheling	32.50-33.00
No. 1 Low-phos. Bundles	33.50-34.00
No. 2 Bundles	29.50-30.00
Machine Shop Turnings	20.50-21.00
Mixed Borings, Turnings	21.50-22.00
Short Shovel Turnings.	22.50-23.00
Cast Iron Borings	22.00-23.00
Punchings & Plate Scrap	35.00-36.00

Cast Iron Grades

No. 1 Cupola Cast	38.00-40.00
Heavy Breakable Cast.	33.00-35.00
Clean Auto Cast	38.00-40.00

BUFFALO

No. 1 Heavy Melt. Steel	$35.50-36.00
No. 2 Heavy Melt. Steel	29.50-30.00
No. 1 Busheling	29.50-30.00
No. 1 Bundles	29.50-30.00
No. 2 Bundles	27.50-28.00
Machine Shop Turnings	22.00-22.50
Mixed Borings, Turnings	22.00-22.50
Cast Iron Borings	22.00-22.50
Short Shovel Turnings.	24.00-24.50
Low Phos.	38.00-38.50

Cast Iron Grades

No. 1 Cupola	36.00-36.50
Mixed Cast	34.00-35.00
Heavy Breakable	31.00-32.00
Malleable	34.00-37.00
Clean Auto Cast	41.00-42.00

Railroad Scrap

Rails 3 ft. and under.	49.00-50.00
Scrap rails	45.00-46.00
Railroad specialties	44.00-45.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	$35.00-36.00
No. 2 Heavy Melt. Steel	31.00
No. 1 Busheling	31.00
No. 1 Bundles	35.00-36.00
No. 2 Bundles	27.00
Machine Shop Turnings	22.00-23.00
Mixed Borings, Turnings	19.00-20.00
Short Shovel Turnings.	25.00-26.00
Bar Crop and Plate	39.00
Punchings & Plate Scrap	39.00
Cut Structurals	39.00
Elec. Furnace Bundles.	36.00
Heavy Turnings	35.00-36.00
No. 1 Chemical Borings	nom.

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00
No. 1 Machinery Cast.	38.00
Charging Box Cast	34.00-36.00
Heavy Breakable Cast.	34.00-36.00
Unstripped Motor Blocks	33.50
Clean Auto Cast	35.00-36.00
No. 1 Wheels	40.00-41.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$26.00-27.00
No. 2 Heavy Melt. Steel	23.00-24.00
No. 1 Busheling	21.00-22.00
No. 1 Bundles	26.00-27.00
No. 2 Bundles	20.00-21.00
No. 3 Bundles	nominal
Machine Shop Turnings	15.00-16.00
Mixed Borings, Turnings	14.00-16.00
Short Shovel Turnings.	18.00-20.00
Punchings & Plate Scrap	28.00-29.00
Cut Structurals	nominal
Elec. Furnace Bundles.	27.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-31.00
No. 1 Machinery	33.00-34.00
Charging Box Cast	29.00-30.00
Heavy Breakable	29.00-30.00
Unstripped Motor Blocks	26.00-27.00
Malleable	nom.

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$26.00-27.00
No. 2 Heavy Melt. Steel	23.50-24.00
No. 1 Bundles	24.50-25.50
No. 1 Busheling	22.50-23.50
Machine Shop Turnings	19.00-20.00
Mixed Borings, Turnings	19.00-20.00
Short Shovel Turnings.	21.00-22.00
Bar Crops and Plate	30.00-31.00
Punchings & Plate Scrap	30.00-31.00
Chemical Borings	28.00-29.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-31.00
Heavy Breakable Cast.	28.00-29.00
Stove Plate	29.00-30.00
Unstripped Motor Blocks	28.00-30.00
Clean Auto Cast	29.00-31.00

CHICAGO

No. 1 Heavy Melt. Steel	$33.00-35.00
No. 2 Heavy Melt. Steel	30.00-33.00
No. 1 Bundles	33.00-35.00
No. 2 Bundles	28.00-31.00
No. 3 Bundles	26.00-29.00
Machine Shop Turnings	22.00-23.00
Mixed Borings, Turnings	22.00-23.00
Short Shovel Turnings.	22.00-23.00
Cast Iron Borings	22.00-23.00
Bar Crops and Plate	36.00-39.00
Punchings	37.00-39.00
Elec. Furnace Bundles.	35.00-36.00
Heavy Turnings	31.00-33.00
Cut Structurals	37.00-38.00

Cast Iron Grades*

No. 1 Cupola Cast	40.00-43.00
Clean Auto Cast	40.00-45.00
No. 1 Wheels	41.00-42.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	36.00
Malleable	40.00*
Rails, Rerolling	45.00-46.50
Rails, Random Lengths	41.50
Rails, 3 ft. and under.	45.00
Rails, 18 in. and under	45.00-46.00
Railroad Specialties	41.00-42.00
Angles, Splice Bars	43.00-44.00

* Nominal.

ST. LOUIS

No. 1 Heavy Melt. Steel	$32.00-34.00
No. 2 Heavy Melt. Steel	29.00-30.00
Machine Shop Turnings	20.00-21.00
Short Shovel Turnings.	20.00-21.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-38.00
Charging Box Cast	31.00-32.00
Heavy Breakable Cast.	32.00-33.00
Brake Shoes	31.00-32.00
Clean Auto Cast	36.00-38.00
Burnt Cast	27.00-30.00

Railroad Scrap

R.R. Malleable	33.00-36.00
Rails, Rerolling	42.00-43.00
Rails, Random Lengths	33.00-35.00
Rails, 3 ft. and under.	39.00-40.00
Uncut Tires	39.00-40.00
Angles, Splice Bars	37.00-39.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$29.00
No. 2 Heavy Melt. Steel	29.00
No. 1 Busheling	29.00
No. 2 Bundles	27.00
Long Turnings	24.00
Short Shovel Turnings.	24.50
Cast Iron Borings	24.50
Bar Crops and Plate	35.00
Cut Structurals	36.00

Cast Iron Grades

No. 1 Cupola Cast	41.00-42.00
Stove Plate	38.00-39.00
No. 1 Wheels	39.00-40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.50
R.R. Malleable	nominal
Rails, Rerolling	41.00-43.00
Rails, Random Lengths	38.00-40.00
Rails, 3 ft. and under.	40.00-42.00
Angles and Splice Bars	40.00-42.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$25.00
No. 2 Heavy Melt. Steel	*25.00
No. 1 Busheling	*25.00
Nos. 1 & 2 Bundles	*23.00
No. 3 Bundles	*20.00
Machine Shop Turnings	*15.00
Bar Crops and Plate	*25.00
Cast Steel	*25.00
Alloy Free Turnings	*15.00
Cut Structurals	*25.00

Cast Iron Grades

No. 1 Cupola Cast	35.00

Railroad Scrap

No. 1 Heavy Melting	*26.00
Wheels	*29.50
Rails, Random Lengths	*26.50

*F.o.b. California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	25.00
No. 1 Busheling	25.00
Nos. 1 & 2 Bundles	23.00
No. 3 Bundles	20.00
Machine Shop Turnings	27.50
Mixed Borings, Turnings	27.50
Punchings & Plate Scrap	35.00
Cut Structurals	26.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	32.50
Heavy Breakable Cast.	32.50
Stove Plate	27.50
Unstripped Motor Blocks	32.50
Malleable	32.50
Brake Shoes	22.50
Clean Auto Cast	27.50
No. 1 Wheels	37.50-40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	25.00
Railroad Malleable	27.50
Rails, Random Lengths	25.00
Angles and Splice Bars	22.50

LOS ANGELES

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	25.00
Nos. 1 & 2 Bundles	23.00
No. 3 Bundles	20.00
Machine Shop Turnings	15.00
Mixed Borings, Turnings	15.50-16.00
Punchings & Plate Scrap	33.00-36.00

Cast Iron Grades

No. 1 Cupola Cast	$30.00-35.00

HAMILTON, ONT.

(Ceiling prices, delivered)

Heavy Melt.	$23.00
No. 1 Bundles	23.00
Mechanical Bundles	21.00
Mixed Steel Scrap	19.00
Mixed Borings, Turnings	17.00
Rails, Remelting	23.00
Rails, Rerolling	26.00
Bushelings	17.50
Bushelings, new factory, prep'd	21.00
Bushelings, new factory, unprep'd	16.00
Short Steel Turnings	17.00

Cast Iron Grades*

No. 1 Cast	48.00
No. 2 Cast	44.00

* Removed from price control Aug. 9, 1947; quoted on basis of f.o.b. shipping point.

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1899—1949

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STAMPINGS cut from strip steel, stainless steel, brass, aluminum or Monel are fed—one by one—into a machine which folds each one into a chain link, producing a continuous chain of flat link type. In the smaller sizes, the whole operation is faster than the eye can follow.

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TRADE MARK

In Business for Your Safety

Sheets, Strip . . .

Cutbacks and suspensions ease pressure for sheets. Added tonnage in prospect

Sheet Prices, Page 148

Philadelphia—While there are cutbacks here and there, suspensions and even some further cancellations, sheet mills still are having no difficulty keeping their schedules filled. They are admittedly more interested in development of new business and in all probability will have more tonnage to supply customers before end of second quarter. Nevertheless, as of now, they can still sell more tonnage than they can produce. Backlogs are still heavy.

Drying up of the gray market and continued shrinkage of high-priced conversion deals have not only tended to sustain pressure on the mills, but to increase it in various cases. Actually, there are still gray market offerings, but they are not nearly as numerous as they were and premiums asked are substantially reduced.

New York—Further easing in sheet demand is noticeble, with eastern producers able to offer a little more than heretofore, as well as certain of the inland mills. However, in general there is still more demand for nonpremium tonnage than there is supply and most mills still have substantial backlogs. The outlook for the second quarter is for somewhat more tonnage than now indicated by consumer quotas, but a balance between supply and demand still seems to be some time off on such major items as hot and cold-rolled sheets and galvanized sheets.

Demand for enameling stock is appreciably off, due primarily to substantial cutbacks in the manufacture of stoves, refrigerators and deep freeze units, among consumer durable items. Demand for electrical sheets also lags. On the other hand, inquiry for stainless sheets and strip appears to have picked up slightly as a result of a little more activity in paper mill and textile mill construction. Also food processing is fairly active and is contributing to the slight betterment. However, sheets and strip can be had for shipment from mills in five to seven weeks and even a little better in certain instances.

Boston—Some silicon and enameling sheet tonnage under allocation has been returned to mills, full quotas being non-marketable in this area. Tonnage in excess of that promised and wasters offered ex-quota are also harder to move, but most carbon flat-rolled allocated is distributed. With selling more competitive, items formerly ignored such as costs, size, finish and grade are now important factors. Another factor complicating distribution is liquidation of stock not wanted in consumer inventories.

Cleveland—With some consumers reducing current demands and also being undecided at to future needs, sellers of carbon sheets and strip find it necessary to do a considerable amount of shifting of tonnage in setting up mill schedules for second quarter. Some consumers find it difficult to state their needs now for June. However, the automotive trade

is reported to be putting on heavy pressure for steel for second-quarter usage.

Cincinnati — District sheet mills are establishing tonnage allotments for May, now deeming it preferable to abolish the quarter schedules heretofore the practice. The new plan better fits present conditions which reflect considerable shifting in demand. Needs in some consumer goods, such as stoves and small motors, are off badly but overall requirements of the market still exceeds production.

Birmingham—No let-up in demand for sheets is noted in this district. Local output is so widely distributed and so diversified in use that the tapering-off process noted generally is not in evidence here. Steel interests say there have been a few scattered deferments and cancellations for various specifications in steel but not in volume sufficient to be reflected in the production rate.

St. Louis—A slight increase in demand for sheets is noted in this district, manifest mainly in renewed interest in conversion deals. This is attributed to a desire of a few big consumers to protect their earlier investments in ingots and to step up production programs. The revised voluntary steel allocations program also is creating some freight demand. Sheet producers here predict an unusually heavy tonnage load the third quarter, when the impact of the Marshall Plan will be felt for the first time, but expect it to be partly offset by reductions in some of the domestic allocations programs. Third quarter books will not open until mid-May, after allocations demands have been clarified. In the face of upping demand and Granite City Steel's $10 premium price cancellation, there is none of the pressure here for price cuts reported in other districts and none is seriously expected this year. Farm equipment is one of the mainstays of this area's steel industry, and last week two of the biggest farm equipment manufacturers reported no signs of shrinkage in their 7 to 8-month order backlogs.

Los Angeles—Pressure for delivery of flat-rolled material has eased perceptibly, although at the same time demand is perking up among some of the smaller manufacturers who in recent weeks have required very little. Some appliance producers, for example, are coming back into the market as they succeed in working off high-priced inventories. Cold-rolled sheet in good volume now is coming into this district from eastern sources, and is helping to lighten the load on local sheet mills.

San Francisco—The gradual trend toward parity in the supply and demand of sheets continues, although overall requirements still are not satisfied. Many fabricators are buying on hand-to-mouth basis, and small firms are either canceling mill orders or are re-selling allocated shipments to warehouses or other users. Premiums have all but disappeared. Small plants, which have been hardest hit by declining business and which have reduced steel buying substantially hope for spring upturn in business. As yet, however, few signs have appeared of a seasonal rebound.

Job File No. 1001

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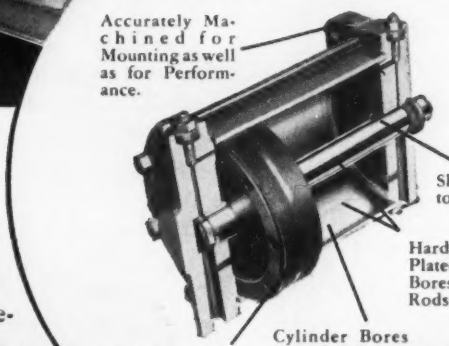
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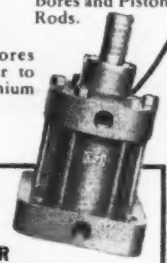

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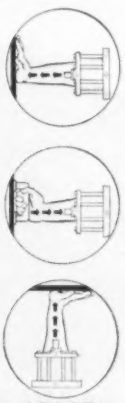

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8-539

UNITED STATES STEEL

Plates . . .

Plate Prices, Page 149

Philadelphia — While the overall picture in plates is definitely easier than several weeks ago, mill operations are still high and the premium price mills are still getting their prices. Excess tonnage material is being offered by one such mill at a concession of as much as a cent a pound under its price for tonnage to be processed, but in general there is no change in mill prices, premium or otherwise. Consumers continue willing to absorb freight from at least as far inland as Pittsburgh on non-premium tonnage. Such being the case, it is obvious that plate demand in general continues active. At the same time, it is likely that non-certified consumers will be supplied more tonnage as weeks go by, especially in the light of shrinking demand for steel for freight car construction and maintenance.

Boston—As competition becomes intensified, plates are not immune. Premium priced tonnage moves slowly, while high carbon, alloy and floor plates are affected by more discriminating policy on part of buyers. Plate fabricators sense trend toward buyers' market and are buying closer to requirements. Although more plate tonnage is available because of reductions in certified requirements, relatively little additional volume is offered in this territory since tonnage released in Pittsburgh can still be sold nearer point of production.

Birmingham — Considerable slackening is noted in production of freight cars in the Birmingham district with the result that the Bessemer plant may not accept its plate quota for May. Inquiry, however, reveals that even so, the tonnage thus gained when spread among the many plate users dependent upon this district will be negligible and have little effect upon the overall situation.

San Francisco—"Critical" continues to be the classification for heavy plates, although some minor easing is reported for light gages. However, this latter trend is not widespread enough to cause an overall change in the prospect that plate demand will continue to be heavy and supply short for several years.

Seattle—Plate fabricators complain of the shortage of materials which hanicaps them in seeking large contracts. Current operations are restricted by low inventory. Backlogs are fair, mostly for tanks and small boilers.

Steel Bars . . .

Bar Prices, Page 148

Boston—Supply-demand balance has been attained in carbon bars, and cold finishers are operating below peak with backlogs lower. Numerous specification changes and cutbacks ushered in a 60-90 day buying policy by most consumers. Where allocated, hot-rolled carbon bars are distributed over a broader range, but more of a selling job is required to accomplish this. In line with more conservative buying, consumers are also checking costs closer and placing more orders where steel can be put

down at their plants at lowest available charge considering freights.

Consumption is lower with warehouse stocks in better shape, although still unbalanced as to sizes, notably flats. Bolt orders are coming in to some shops in volume less than half that of last quarter. Deliveries are closer to schedule on carbon bars while openhearth alloys are promised in four to six weeks; electric furnace six to eight weeks.

New York—Although hot carbon bar consumers generally anticipate larger shipments during the second quarter, most sellers up to now have not increased their allotments to any appreciable degree. This, buyers believe, will come a little later as requirements become less pressing. Actually there are more spot openings which are redounding to the advantage of various consumers, but they are more important at present from the standpoint of indicating a possible trend than from the standpoint of tonnage. Sellers which have tonnages to offer at going mill levels have little difficulty in finding an outlet. Shortage is still pronounced in the very small sizes and also in the large range, from 4 inches up. Cold drawn carbon bars are relatively less stringent, with most consumers able to acquire tonnage in most any specification within a matter of several weeks at the latest.

Philadelphia—Although there is an overall easing in the supply of hot carbon bars, some leading eastern producers claim their position is more stringent than in some weeks, especially in small and large rounds and flats. Their second quarter consumer quotas are unchanged and they still doubt that there will be any revisions before June, if then. Cold drawn carbon bar producers are making headway on backlogs, and in some instances are able to supply tonnage in most any specification within a period of several weeks. No important change is noted with respect to alloy bars, with deliveries easy.

Birmingham—Bar demand is well sustained, especially for concrete reinforcing which continues above ability to produce. Some less demand is noted for merchant bars.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 148

Los Angeles—Although light construction is active and there is good demand for reinforcing bars, inventories are better than they have been in many months. With advent of more favorable weather, as well as downward adjustments in cost of some construction items, projects are coming out in better volume. Many of those who have been holding up jobs for price reasons were encouraged when one project for which $160,000 had been budgeted actually went for $130,000. Now in the planning stage are substantial programs for road and bridge building by the California state highway engineers, and for flood control by Army engineers. Construction leaders here look for private building to ease off in 1949, but for public and government construction to increase.

Seattle—Demand for bars, both reinforcing and merchant, is insistent,

A steel supply company faced the handling problem of unloading sheet stock, bar stock and pipe from box cars, storing it in special racks, and loading it onto highway trucks for delivery to its customers. Even with a lift truck, much manual handling was required.

The problem was solved with a Baker 2-ton Crane Truck, which quickly and easily unloads material from box cars to a point where it can be handled by overhead crane. The Baker Truck also facilitates placing material in racks (as shown) and loading highway trucks. Its use has effected savings of 30% handling light stock, and 75% for heavy stock.

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Production Lines and Special Automatic Machines by CONTINENTAL

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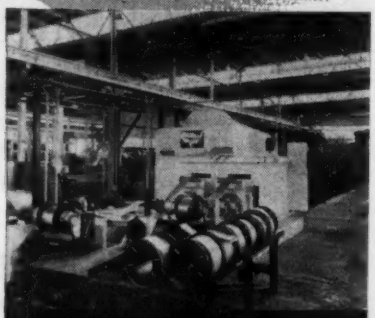
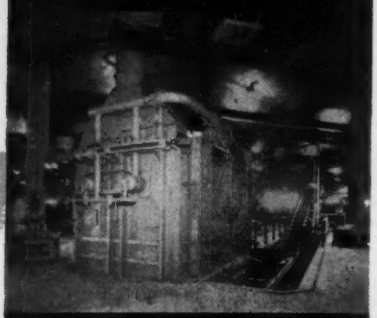
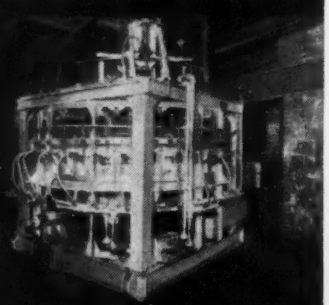


Continental Automatic Strip Production Line consisting of annealer, pickling machine, dryer, and coiler.



Continental Special Automatic Pig Molding Machine complete with automatic charging, melting and pouring.

Continental Automatic Production Line operating from raw materials to completely finished and packed product. This production line consists of fifteen integrated, synchronized, special automatic machines.



Continental Special Automatic Glazing Machine complete with automatic press synchronizer and fire polisher.

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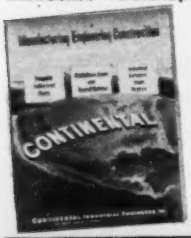

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PRODUCTION LINES
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SPECIAL MACHINES
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MANUFACTURERS—ENGINEERS—CONTRACTORS FOR OVER A QUARTER OF A CENTURY

especially for small tonnages of less than 100 tons each. Mills have sizable backlogs and much business is immediately pending. Shipping facilities have been restored and producing units are again on schedule. Judging from present indications there will be no decline in placements this year.

Structural Shapes . . .

Structural Shape Prices, Page 149

New York—While few new orders are reported, structural inquiry is at least being sustained, with fabricators anticipating a somewhat more active market as the spring season gets under way. Demand is still dominated by public work. Most of the smaller fabricators have three or four months' backlog while the larger have orders ranging up to six and seven months at the present rate of operations. Actually, shape supply is a little easier, with indications that fabricators may be able to step up their current rate of operations over the next few months.

Philadelphia—The 16,000-ton state bridge on Penrose avenue, Philadelphia, is being deferred temporarily, with bids now expected to be asked in about six to eight weeks. A 4200-ton Pennsylvania state bridge over the Monongahela river, Elizabeth, also is expected to be brought out for bids in about that time. Meanwhile, some smaller bridge jobs are being figured. Bids are expected to be asked late in April on a $14 million federal court house in Washington. Private work is spotty, with few outstanding projects. Shape supply is easier, with some sellers now indicating that they may have more tonnage to allocate in the second quarter than anticipated recently.

Boston—That district fabricating shops are getting more structural tonnage is apparent by their ability to make earlier delivery; in one case five weeks was promised and most projects, 200 tons or less, are awarded on delivery basis. Some of the larger shops are still five to six months away. Tonnage placements are slightly heavier, but inquiry is slow to pick up, notably public work involving bridges. Prices for fabricated steel remain high, which combined with other building costs, put a damper on private construction. Mounting taxes by cities and towns tends also to retard some public building unless federal aid is forthcoming.

Birmingham—Scattered and widely diversified need for shapes keeps overall demand exceedingly high. Most fabricators are fairly well booked on contracts set for spring. Considerable shape business is in the drawing board stage.

Los Angeles—With exception of one or two items, shapes have attained a supply-demand balance. The slowdown in heavy construction continues, most of the current demand for materials coming from miscellaneous small projects. Nevertheless, a pickup in bigger jobs is anticipated within the next 60 to 90 days, for there are many projects on the board. Pressure on wide-flanged beams in this district has been greatly relieved in recent weeks by substantial and

continuing shipments from eastern mills.

Seattle — Fabricators report supplies of standard steel angles and channels are easier but wide flange beams continue extremely short with no immediate relief promised. This situation hampers bidding for large projects. Plant operations continue at normal with backlogs fairly large. Considerable tonnage is pending, mostly for public works.

Wire . . .

Wire Prices, Page 149

Pittsburgh—There is an increasing tendency among distributors of merchant wire products to base purchasing policy to a greater extent on normal seasonal trends. Softening in demand combined with improved mill supply has accentuated this tendency in recent weeks. Mill production schedules are full through first half, although some adjustment in product mix is indicated in second quarter. In addition to changing pressure in delivery for specific wire products, due to seasonal factors, some revamping in operating schedules has been necessary as result of realigning of producers' distribution pattern with emphasis on strengthening position within logical marketing areas.

Boston—Premium prices for manufacturers and other grades of wire are under pressure as selling becomes more competitive. Additional independent mills are withdrawing f.o.b. mill prices and establishing nearer competitive level. Slump in wire buying is due largely to inventories, with most consumers attempting to get down to 50-60 day basis and drawing on supplies held beyond that period. With possible exception of textile mill equipment builders, demand is generally lower.

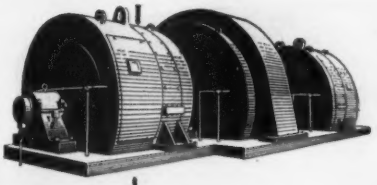
Screw manufacturers are drawing on inventories against lower backlogs and some will take less tonnage next month than in recent years. Most mills have scheduled production for that month and are starting on May. Rod supply has improved slightly. Short length and quantity extras for wire rope have been withdrawn.

Birmingham — Wire products, according to mill sources, are just about the only product of the district which seem to have definitely caught up with demand. Except for certain popular sizes in nails, it is reported, there is no frenzied demand for wire.

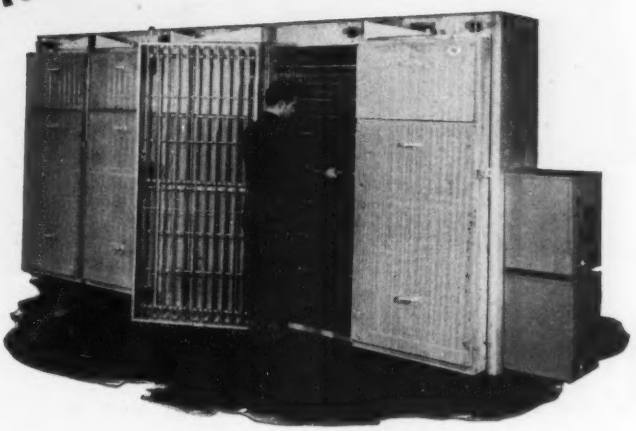
Tin Plate . . .

Tin Plate Prices, Page 149

Pittsburgh—Lessening intensity in demand for tin mill products is noted among major producers. However, sellers contend that production schedules to date have not been adversely affected by customer order cancellations or hold-up of shipments. Mill inventories of tin plate remain very low and the same is generally true of most consumers. First half output of tin mill products is expected to exceed that recorded in 1948, although there is some question whether production for the full year will exceed last year's record output. Most sellers anticipate a substantial decline in output of tin plate in the final quarter this year.



Where clean air returns a cool profit



COOLING mill motors—either by force ventilation or a recirculating system—introduces a serious air cleaning problem. All of the air used with forced ventilation or that portion required for make-up with recirculation must be cleaned. The nature and volume of dust created by steel mill operation makes it necessary to clean any outside air entering the motor room.

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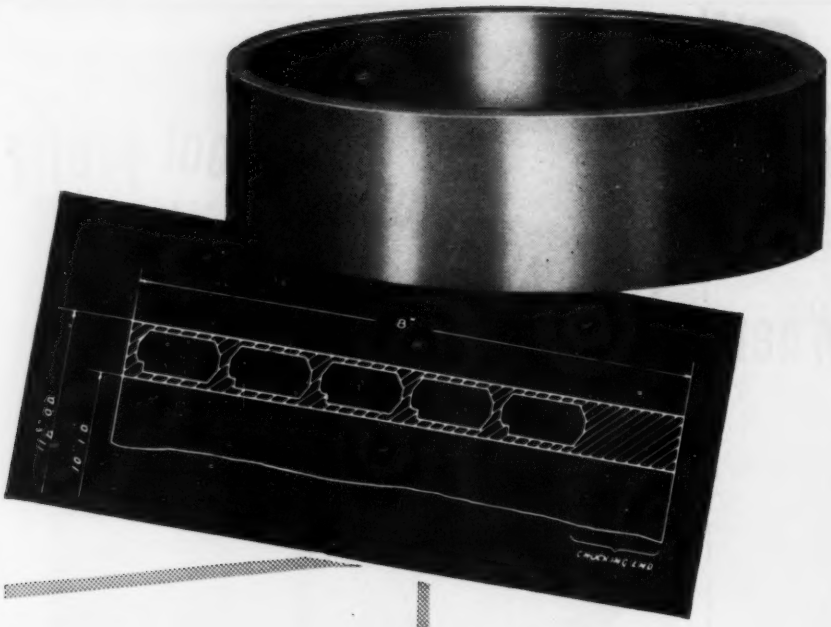

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LEBANON ALLOY AND STEEL Castings

CIRCLE L

Semifinished Steel . . .

Semifinished Prices, Page 148

Cleveland—With auto manufacturers pushing heavily for finished steel for delivery in the first half, they are still figuring importantly in the conversion ingot market. One producer reports full order books for conversion ingots for March delivery. However, it has not been determined whether orders for April delivery will equal those of March.

Tubular Goods . . .

Tubular Goods Prices, Page 149

New York—Some grades of hot mechanical tubing are in easier supply, with most leading mills able to offer 4-inch diameter and over for April shipment. Also one producer has been able to step up shipments on ½ in. outside diameter cold drawn mechanical tubing and smaller and $\frac{9}{16}$ to ¾ in. to around four to six weeks. There has been little change in the other sizes with some mills out of the market entirely on such items as cold drawn tubing over 1½ in. and hot mechanical tubing 2¾ in.

Hot finished boiler tubes continue scarce with nothing in the way of early deliveries available. In cold-drawn carbon boiler and condenser tubes, 1½ in. is available for shipment in June from one mill, although this producer is making no promises on the larger sizes.

Cleveland—Mounting stocks of petroleum with resultant lower prices are slowing up drilling activity, indicating demand for oil country tubular goods will ease. However, outlook continues strong for line pipe. Jobbers note an easing in pressure for delivery of merchant pipe, their customers also showing an increasing price consciousness.

Seattle—Spring interest in cast iron pipe has not developed although much potential business is likely to be up for bids in the near future.

Warehouse . . .

Warehouse Prices, Page 151

Pittsburgh — Jones & Laughlin Steel Corp. has reduced its warehouse quotations on those products which carry premium prices to following levels: Hot-rolled sheets and strip reduced 5 cents to $4.85 and 10 cents to $5 per 100 pounds, respectively; hot-rolled structural shapes from $4.95 to $4.90 per 100 pounds; plain plates from $5.25 to $5.05; and hot-rolled bars, reduced 30 cents to $4.90 per 100 pounds. Company also is now allowing quantity discounts on hot-rolled bars, in line with other distributors, as follows: 2000 to 9999 pounds, 10 cents; over 10,000 pounds, 20 cents.

Demand for steel from warehouse stocks is not nearly as urgent as was the case through most of last year.

Philadelphia—Jobbers report some improvement in business. Whereas recently certain distributors reported a decline in day-to-day sales, as compared with February, they now assert that business is surpassing last month on this basis. Jobbers are still having difficulty keeping stocks

in balance, particularly shapes, plates and flat bars.

Cincinnati—Jobbers of the district are gradually improving their inventory position although stocks are still somewhat unbalanced and inadequate to meet all demands. The supply situation with regard to scarce steel such as sheets, plates and structurals is modestly improved with heavier mill shipments foreseen.

Los Angeles—Jobbers' inventories are greatly improved, with exception of sheets and plates. Structurals and bars remain plentiful. So that they can fill orders more completely, warehousemen are doing more "pickup" buying for customers, searching the market for ordered items which are not available in their own stocks. Stainless has been in relatively good supply, but demand continues to grow among auto accessory manufacturers, builders of restaurant and hospital equipment, and aircraft manufacturers.

San Francisco—Not much improvement is being reported in warehouse volume. Inventories of most items, plates and sheets excepted, are increasing, and some progress is being made to smooth out unbalance in stocks which plagued warehousemen last year. Prices remain steady.

Seattle — Resumption of outside construction is reflected in increased turnover in the jobbing trade. The peak is expected in April. This month's volume shows a marked increased over January and February. Plates and sheets, particularly galvanized, continue critical, reinforcing steel is somewhat easier. Demand for alloys is stagnant due to reduced machine shop operations. Price schedules are unchanged.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 150

Pittsburgh — Prospect of a prolonged coal strike soon is expected to result in increased demand for foundry coke. Spotty operations among many jobbing foundries in this district have resulted in some of these interests accumulating fair stocks of coke and there were some signs of possible price weakness for early April. However, the coal strike may prevent price reduction in the near future. Daingerfield oven coke continues to be shipped into this district at relatively high delivered price. Overall supply of furnace coke continues tight.

Thirty-five new coke ovens are being installed at Pittsburgh Coke & Chemical Co.'s Neville Island plant, which will increase by 50 per cent the company's present coke capacity of 450,000 tons annually. Of these ovens, 20 will be erected by General Motors on property leased from Pittsburgh Coke, to be operated and managed by the latter company. Unconfirmed report indicates some of the furnace coke allotted to General Motors will be shipped to the Mingo plant of Wheeling Steel Corp. for utilization in blast furnace leased by General Motors from Wheeling. Some of the coke also conceivably would be used in the operation of Struthers blast furnace.

To insure uniform quality, the Latrobe Electric Steel Company inspects billets and bars of their Desegatized* brand tool steel with a Sperry Type SRO4 Ultrasonic Reflectoscope.

So efficient is the Reflectoscope as a "protector" against defects that Latrobe states, "To the best of our knowledge, no Desegatized* steel containing bursts, pipes, gas pockets or other major internal defects has been able to pass the rigid test of Reflectoscope inspection."

This statement, by one of an increasing number of progressive steel producers who are using the Reflectoscope in production tests, testifies to the advantages of ultrasonic testing. The Sperry Reflectoscope . . .

Tests materials "in place"
Penetrates to 25 feet
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The new SRO5 Reflectoscope combines all the advantages of the earlier model plus fewer controls, portability and lower costs. Write for complete details, Bulletin *3001*.

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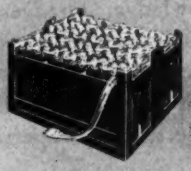

EDISON STORAGE BATTERY DIVISION
of Thomas A. Edison, Incorporated, West Orange, N. J.
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Pig Iron . . .

Pig Iron Prices, Page 150

Pittsburgh—Merchant pig iron supply for foundries in this area will not be adversely affected by commitment on part of Pittsburgh Coke & Chemical Co. to supply General Motors Corp. with pig iron, foundry coke and furnace coke for a five-year period, commencing Sept. 1, 1949. Fulfilling of this pig iron commitment for General Motors contemplates use of blast furnace support other than the Neville Island unit. In this connection, unconfirmed report indicates that at least part of the output of Struthers furnace will be made available to General Motors.

Merchant iron foundries report little improvement in demand, although most are confident that new orders will increase early in April. Large captive foundries continue to operate full production schedules, in contrast to three- to four-day per week output among jobbing concerns. However, larger foundries report substantial reduction in order backlogs in recent weeks.

Buffalo—Despite a general reduction in foundry melt, leading pig iron producers continue to find a ready outlet for total production. Indications point to a leveling-off in foundry operations to rates prevailing during the last two weeks. Interest during the week was centered in the early opening of the navigation season. The Steamer *Perseus* was loaded with 7000 tons at the Hanna dock, destined for the upper lakes. The Steamer *Tampico* reached here, the "first" boat of the season, with a load of stone from Marblehead for Republic Steel Corp.'s plant.

Pig iron production continues at 100 per cent of capacity, but one stack is due to go down within two weeks.

New York—The two-week suspension of coal mining has had little indirect effect on pig iron demand. Most consumers believe the mining suspension, if lasting no more than two weeks, will have no effect on blast furnace production as fuel inventories are in good shape.

Consequently, demand for iron continues to ease off. An increasing number of foundries in this district are building up a fairly comfortable backlog and in view of reduced operations and the continued easing in scrap supply are more or less inclined to drift for a while. Few have suspended pig iron shipments entirely, but an increasing number have cut back somewhat on allotments.

Boston—As demand for pig iron eases, supply increases with more furnaces offering tonnage; several producers, out of this market for many months, are again offering iron. Some tonnage is being accumulated at Everett furnace, but volume is not sufficient to warrant an early run on basic.

Philadelphia—Decline in foundry melt is leveling off. Foundries generally are revising their prices on castings, with a result they are again developing more business. In addition to lower priced castings, better quality of casting is also having some bolstering effect. Foundries are now able to obtain pig iron according to

specification and are no longer having to accept substitute material.

Lukens Steel Co., Coatesville, Pa., is reported to have taken 6200 tons of Indian pig iron imported in February. The price paid for the iron, produced by Tata Iron & Steel Co. Ltd., Calcutta, was said to be $50 per ton, delivered Coatesville.

Cincinnati—Pig iron supplies are much easier, an indication of the low level of foundry melt. Shifting of tonnage from those unwilling to accept full allotments has given better supplies to foundries needing more iron.

Birmingham—Pig iron supplies remain in relatively tight demand, largely because needs of cast iron soil pipe plants are more than able to offset some supplies made available by reduced operations in other industries.

St. Louis—Koppers Co. blast furnaces at Alton, Ill., this district's principal pig iron supplier, last week reached the highest production rate in five years, officials said. On the basis of the first ten days of the month, March output will average 1150 tons daily, as compared to the normal 1040 tons. Increase is attributed to better coking coal and increased efficiency of the B furnace, relined three months ago. Even with the stepped up rate, however, officials see no immediate prospect of ending their system of allocating iron to customers.

Minnequa, Colo.—Colorado Fuel & Iron Corp., effective Mar. 16, reduced its pig iron prices. The new base prices are $47.50 per gross ton on malleable iron and $47.00 per gross ton on basic iron, f.o.b. furnace. This price change affects both the furnaces of the corporation's Wickwire Spencer Steel Division at Minnequa.

N. J. Zinc Advances Spiegeleisen

Palmerton, Pa.—New Jersey Zinc Co. has advanced all grades of spiegeleisen $3 a ton, effective Mar. 17. Under new schedule, the 19-21 per cent grade is now quoted at $65 Palmerton.

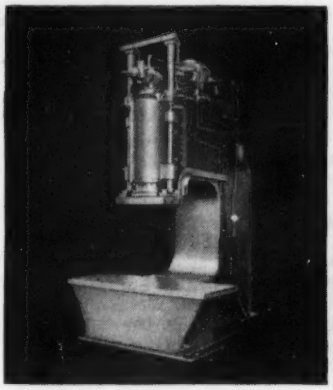
Scrap . . .

Scrap Prices, Page 154

Pittsburgh—Purchases by leading producers have clarified the scrap price structure, at least temporarily, and have emphasized the trend toward re-establishment of normal price differentials between various classifications. Price level currently is $37 for No. 1 heavy melting; $35 for No. 2 open-hearth scrap; and $32 for No. 2 bundles. One mill has purchased low phos at $39.50, and sale of blast furnace turnings at $27.25 has established the turnings market at about $2 below previous quotations.

Cast grades remain nominal, with continued reduction in offering prices noted. Last sale of raliroad heavy melting was at $40, but on the basis of recent offering prices the market is believed within the range of $38 to $40.

Philadelphia—Scrap is featured by further sharp reduction in steel



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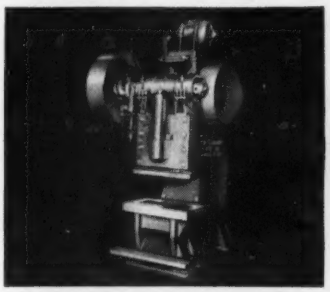
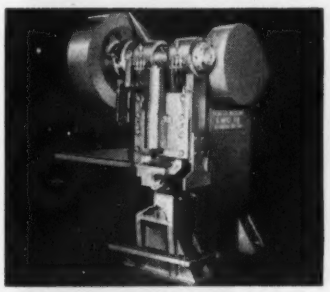
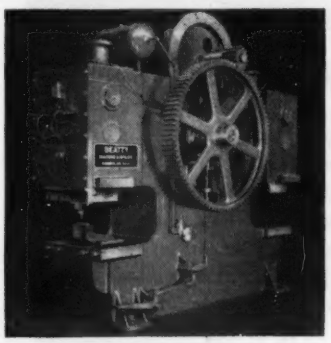


BEATTY Single End Punch available in capacities up to 200 ton.



BEATTY Single End Bar Shear available in capacities up to 300 ton.



BEATTY 200 ton Double End Toggle Punch.

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BEATTY MACHINE AND MFG. COMPANY
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grades and by continued lack of consumer interest. No. 1 heavy melting steel is quoted $35 to $36, delivered, No. 2 heavy melting and No. 1 bushseling at $31, No. 1 bundles at $35 to $36, and No. 2 bundles at $27.

Sharpest decline of all has come in mixed borings and turnings which are off about $10 from a week ago, at a spread of $19 to $20, delivered. This material is seldom stored and some buying has been consummated at prices which represented a reduction of around $18 since the first of the year.

Cast grades are now much steadier than steel scrap. In fact, while some leading sellers are still refusing to make any predictions as to how much further steel scrap prices may decline, they are now less reticent with respect to cast. They believe that cast is near the bottom, especially in view of the much lower prices that now prevail for cast as compared with pig iron.

Buffalo—Mills turned a deaf ear to dealers' attempts to obtain additional scrap orders around recent sales figures. As a result, prices tumbled an additional $3 to $4 a ton, and even at the reduced levels business remained at virtually a complete standstill during the week. Volume of scrap being used in the area was reported at a low level as mills were using increased quantities of hot iron in open hearths. It became apparent that mills would have little or no trouble making reserve stocks last until the lake movement of scrap gets under way.

Dealers and mills alike had difficulty figuring even what a nominal market should be on steelmaking grades. No. 2 heavy melting steel and related items tumbled to $29.50-$30.00. Turnings plunged to $22.00-$22.50, with short shoveling turnings down to $24.00-$24.50. Cast items were a shade lower with business negligible.

Detroit—With steel mills the country over apparently determined to whittle down scrap inventories further, buying remains dormant. So pronounced has been the restraint that scrap interests are wondering what the effect might be should open-hearth plants move into the market suddenly with orders for scrap. Barring a drop in the steel operating rate, purchases will have to be resumed shortly and if competition for tonnage develops, upward pressure on prices might result. As the situation stands, quoted prices are on the basis of buying early this month and do not mean much now. Ford has reduced melting schedules on four electric furnaces at the Rouge plant from seven to five days weekly, because of a pile-up of ingots awaiting slabbing and blooming.

New York—Scrap demand continues dull, with New York brokers further reducing their buying prices on most grades of steel scrap. Cast scrap is a little steadier, although charging box and heavy breakable grades have been reduced $1 a ton to a spread of $29 to $30, f.o.b. shipping point.

No. 1 heavy melting is now holding at $26 to $27 and No. 2 heavy melting at $23 to $24.

Boston—Prices have weakened although there is little demand on which to establish quotations. No. 2 heavy melting has slid to $23.50-24.00 and usual differentials between minor grades of steel scrap are not operative. Small lots of cast have sold at lower prices. Cupola cast at $30.00-31.00 is less than half of the postwar peak price and the drop in values of open-hearth steel is nearly as drastic.

Cincinnati—Scrap rails are lower in the district market, with none of the grades showing strength which might lead to belief prices had leveled off. Mills are taking tonnage on old contracts, but these are expiring soon and the new buying is light and spotty as none wants heavy inventory in a falling market. Foundry grades are extremely dull.

Birmingham—The district's scrap prices remain unchanged this week but a noticeable weakening tendency is still reported. Republic Steel Corp., largest buyer, is completely out of the market with the result there is virtually no outlet for heavy melting, still posted at $29. Considerable railroad scrap has appeared. Southern Railway alone, it is reported, produced 60 cars in February instead of a normal 40. Dealers look for further declines.

Dallas—Orders for scrap of all kinds in Dallas have reached a standstill, the activity so low that yards and brokers are reluctant to quote figures on what a "market"

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price would be. There is not enough business to "make a market," though dealers estimate that if any metal were being sold, a maximum price of $35 a gross ton, Pittsburgh basis, might be a quotable price.

St. Louis—Scrap prices for quotation purposes remain unchanged although offering figures vary. Biggest variance is in prices brokers are tendering rural scrap dealers in an effort to fill what few consumer orders the brokers have on hand. Scrap yards in this district are depleted and shipments have tapered off more than seasonally.

Los Angeles—Prices are unchanged for both steelmaking and foundry scrap, but the undertone is soft. Although local collections are light, they are adequate to meet requirements, for mill inventories are substantial. Purchases remain small and highly selective.

San Francisco—Receipts of scrap are spotty, and mills, with ample inventories at the moment, are buying selectively. Continued weakness of eastern scrap market has created uneasy undertone to West Coast markets and some observers predict possibility of further price declines if scrap comes out of hiding in any substantial quantity during next month or so.

Seattle—While the mill price for No. 2 heavy melting steel prepared remained at a $25 gross level, the market is unstable and further price reductions may be expected, some interests predicting $20 in the near future.

Ferroalloys . . .

Ferroalloy Prices, Page 151

New York—Due primarily to higher ore costs, the Electro Metallurgical Division of Union Carbide & Carbon Co. has advanced prices on ferromanganese and three other manganese alloys, effective Apr. 1 on contracts, and Mar. 14 on spot shipments. Ferromanganese is being advanced $12 to $172 per gross ton of alloy in bulk carlots, and to $184 in packed carlots, f.o.b. mill. The new price on gross ton lots, packed, is $199 and on less ton lots packed, $216.

Silicomanganese has been advanced $7 a ton; ferromanganese briquets, $9, and silicomanganese briquets, $6. The usual spot differential of 0.25c will continue to apply on those latter grades.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1500 tons, General Accounting building, Washington, through John McShain, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

1140 tons, Seattle branch, Federal Reserve bank (previously reported) to Bethlehem Pacific Coast Steel Corp., Seattle; general contract just awarded to Kuney-Johnson Co., Seattle, low $2,584,000.

708 tons, high school, Beloit, Wis., to Milwaukee Bridge Co., Milwaukee; Sherry-Richards Co., Chicago, general contractor.

495 tons, turbine supports, New England Power Co., Salem and Worcester, Mass., to American Bridge Co., Pittsburgh.

470 tons, township high school, Hinsdale, Ill., to Allied Structural Steel Cos., Chicago.

460 tons, enameling plant, Kaiser Fleetwing Inc., Bristol, Pa., to Belmont Iron Works, Eddystone, Pa.

450 tons, Lewistown, Pa., hospital, to Bethlehem Fabricators, Bethlehem, Pa.

415 tons, Community hospital, Sunbury, Pa., to Bethlehem Contracting Co., Bethlehem, Pa.

389 tons, grade separation project, Queens, for Department of Parks, New York city, through Bull Contracting Co., to Harris Structural Steel Co., New York.

314 tons, Red river bridge, No. 6632, Minnesota, to American Bridge Co.

312 tons, bridge proj. UGI-90-(4), Denver, Colo., to Burkhardt Steel Co., Denver.

260 tons, Home of Aged and Infirm Hebrews of New York, New York city, to Grand Iron Works Inc., that city.

250 tons, grain gallery conveyor, Hoosac Pier, Boston, to West End Iron Works, Cambridge, Mass.

250 tons, steel warehouse, Brown-Wales Co., Cambridge, Mass., to West End Iron Works, Cambridge, Mass.

180 tons, Catholic high school auditorium, Harrisburg, Pa., to Anthracite Bridge Co., Scranton, Pa.

175 tons, state bridge, pony truss and approaches, Ayer, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; D'Onfero & Son, general contractor.

160 tons, state bridge, steel plate girder, over Boston & Albany railroad, James street, Worcester, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Northern Construction Co., Lawrence, Mass., general contractor.

135 tons, children's hospital, Boston, to Bethlehem Fabricators Inc., Bethlehem, Pa.; Stone & Webster Engineering Co., Boston, general contractor.

134 tons, Sauk county, Wis., bridge, proj.

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S-0216(4), to Worden-Allen Co., Chicago.

125 tons, Du Pont Photo Products plant, Parlin, N. J., to Bethlehem Fabricators, Bethlehem, Pa.

STRUCTURAL STEEL PENDING

35,000 tons, Maryland state bridge across Chesapeake bay, Bethlehem Steel Co., Bethlehem, Pa., low.

2160 tons, state bridge work, Island Heights—Seaside Heights, Ocean county, New Jersey, bids Apr. 7; project will also require 335 tons of reinforcing steel.

2000 tons, hospital, Indianapolis, for Veterans Administration.

1500 tons, railroad bridge relocation, Alma, Neb., Chicago, Burlington & Quincy.

1200 tons, Bergen Pines hospital, Paramus, N. J., revised plans issued, with bids asked Apr. 4.

1000 tons, science building, Queens College, Long Island, N. Y., bids asked.

600 tons, Detroit dam, Oregon state; general contract to Consolidated Builders; bids opened Feb. 23; low $28,230,500.

400 tons, including sheet piling, Seattle engineering shop building; Brazier Construction Co., Seattle, low $320,581.

385 tons, boiler plant, state hospital, Philadelphia, bids in.

275 tons, Pensylvaia Railroad bridge, Newark, O., bids Mar. 18.

125 tons, Sugar bin building, National Sugar Refining Co., Long Island City, N. Y., bids closed Mar. 10.

100 tons, Gorge powerhouse, Seattle; general contract to Guy F. Atkinson Co., San Francisco.

Unstated, 1022-foot Montana state bridge, Yellowstone county; bids to Helena, Mar. 24.

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REINFORCING BARS . . .

REINFORCING BARS PLACED

9000 tons, General Accounting building, Washington, through John McShain, Philadelphia, general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

1000 tons, housing project, Collingswood, N.J., through E. J. Frankel, contractor, to American Steel Engineering Corp., Philadelphia.

800 tons, various grain elevators in eastern Washington, to Bethlehem Pacific Coast Steel Corp., Seattle; Henry George & Sons, Spokane, general contractors.

400 tons, junior high school, Seattle, to Northwest Steel Rolling Mills Inc., Seattle; Watts Construction Co., Seattle, general contract.

150 tons, addition to Seattle Times plant, to Bethlehem Pacific Coast Steel Corp., Seattle; Teufel Construction Co., Seattle, general contract.

100 tons, grain elevator eastern Washington, to Northwest Steel Rolling Mills Inc., Seattle.

REINFORCING BARS PENDING

6000 tons, 14½-mile section Rocky Coulee wasteway, Columbia Basin project; bids to Coulee, Wash., Apr. 15.

1900 tons, Detroit dam, Oregon; general contract awarded to Consolidated Builders.

1600 tons, 18-story apartment building, Seattle, for Keller-Block Corp.; general contract awarded.

1000 tons, addition to Gorge powerhouse, Seattle; general contract to Guy F. Atkinson Co., San Francisco, low $3,188,268.

686 tons, Wacker Drive extension, Chicago; Herlihy Mid-Continent Co., Chicago, low bidder on general contract.

510 tons, Winchester wasteway, Columbia Basin project; bids soon to Bureau of Reclamation.

400 tons, miscellaneous improvements, Douglas airport, Chicago; bids in Mar. 9.

333 tons, factory, Melrose Prak, Ill., Benjamin Moore Co.; bids in.

320 tons, dairy building, University of Wisconsin, Madison, Wis.; J. H. Findorf & Son, Madison, low bidder.

298 tons, township high school, Hinsdale, Ill.; E. H. Marhoefer Co., Chicago, general contractor.

200 tons, Seattle branch, Federal Reserve bank; general contract to Kuney-Johnson Co., Seattle.

115 tons, spillway and outlet works, Ochoco dam, Prineville, Oregon; bids soon to Bureau of Reclamation.

60 tons, steel channels; bids in to Bonneville Power Adm., Portland, Mar. 14.

Unstated, 200-foot and 130-foot highway spans; bids to Montana Commission, Helena, March 24.

PLATES . . .

PLATES PENDING

1500 tons, Detroit dam, Oregon state; general contract to Consolidated Builders.

300 tons, penstock at Gorge powerhouse, Seattle; general contract to Guy F. Atkinson Co., San Francisco.

PIPE . . .

CAST IRON PIPE PLACED

300 tons, 8- and 12-inch for Port of Portland, to American C. I. Pipe Co., through E. N. Hallgren & Co., Seattle.

CAST IRON PIPE PENDING

125 tons, for cooling cement in Detroit dam, Oregon; general contract to Consolidated Builders.

STEEL PIPE PENDING

Unstated, 12,000 feet galvanized black and seamless; bids to Bonneville Power Adm., Portland, Mar. 22; Spec. No. 4523.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Atlanta & West Point, two diesel-electric

switching locomotives, to Baldwin Locomotive Works.

Chicago, St. Paul, Minneapolis & Omaha, subsidiary of the Chicago & North Western, six 1500-horsepower diesel-electric freight locomotives, to the Electro-Motive Division of General Motors Corp., La Grange, Ill.

Georgia Railroad, one diesel-electric switching locomotive, to Baldwin Locomotive Works.

Ironton Railroad, one diesel-electric switching locomotive, to Baldwin Locomotive Works.

Lehigh Valley, two diesel-electric switching locomotives, to Baldwin Locomotive Works.

Norfolk & Western, 13 steam freight and passenger locomotives, to its own shops in Roanoke, Va.

Norfolk & Western, 13 freight and passenger locomotives to Roanoke, Va., shops, at estimated cost of $3,650,000; seven will be class Y6B, three Class A and three Class J.

Reading Co., 15 diesel-electric switching locomotives, to Baldwin Locomotive Works.

LOCOMOTIVES PENDING

St. Louis-San Francisco, twenty 1500-horsepower diesel-electric road switch engines, authorized by railroad directors.

RAILROAD CARS PLACED

John Ringling, Barnum & Bailey Circus, ten flat cars, to Haffner-Thrall Car Co., Chicago.

RAILROAD CARS PENDING

Interstate Railroad, fifty 50-ton hopper cars, bids asked.

Philadelphia closed bids on 30 trolley coaches Mar. 15.

Toronto, Ont., is asking for bids on 15 trolley coaches.

CONSTRUCTION AND ENTERPRISE

ARKANSAS

DUMAS, ARK.—Federated Compress & Warehouse Co., Cotton Exchange Bldg., Little Rock, Ark., has awarded a $100,000 contract to G. Larry Kelley Construction Co., Little Rock, for construction of a warehouse.

FORREST CITY, ARK.—W. B. Coon Shoe Co., 37 Canal St., Rochester, N. Y., will build a $450,000 shoe factory building.

OZARK, ARK.—Arkansas Electric Co-operative will build a $5,480,000 plant.

PINE BLUFF, ARK.—Pinecrest Cotton Mills Inc. will let a $3 million contract for construction of a factory; Harry & Schumaker, 410 Scarritt Arcade, Kansas City, Mo., architect.

FLORIDA

JACKSONVILLE, FLA.—Lloyd A. Fry Roofing Co., 4818 S. Archer St., Chicago, has awarded a $2 million contract to Campbell-Lowrie & Lautermilch Co., 400 W. Madison St., Chicago, for construction of a manufacturing plant.

IDAHO

WALLACE, IDAHO—Hecla Mining Co. will spend $250,000 in rebuilding a 4-story mining plant.

ILLINOIS

LOCKPORT, ILL.—Globe Oil & Refining Co., 59 E. Van Buren St., Chicago, has awarded a $1.5 million contract to Chicago Bridge & Iron Co., Chicago, for construction of a catalytic cracking unit for its plant located here; Universal Oil Products Co., 310 S. Michigan Ave., Chicago, consulting engineer.

MELROSE PARK, ILL.—Benjamin Moore & Co., 415 N. Green St., Chicago, contemplate erection of a $880,000 plant; Niestadt & Love, 407 S. Dearborn St., Chicago, architect.

MUNDELEIN, ILL.—Callaghan & Co., 401 E. Ohio St., Chicago, will award contracts for a plant to cost $125,000; Olsen & Urbain, 5 S. Wabash St., architect.

NORTH CHICAGO—Motor Products Corp., 2301 Davis St., has received a bid from Peter Hamlin Construction Co., 9 S. Clinton St., Chicago, for construction of a $290,000 factory; Exstrand & Schad, 117 N. Genesee St., Waukegan, architect.

SCHILLER PARK, ILL.—Soreng Mfg. Co., 1901 N. Clybourn Ave., Chicago, has awarded a $320,000 contract to Siever & Klefstad, 3510 N. Kostner St., for construction of a factory.

SKOKIE, ILL.—Mathias Klein & Sons, 3200 W. Belmont St., Chicago, will build a $800,000 plant, Touhy Rd. and McCormick Blvd.; plans by William C. Wright, 7 S. Dearborn St., Chicago.

NORTH CAROLINA

WILMINGTON, N. C.—Lloyd A. Fry Roofing Co., 5818 S. Archer St., Chicago, will build a $750,000 manufacturing plant.

OHIO

ASHTABULA, O.—National Distiller Chemical Corp. will begin construction Apr. 1 of a $10 million plant which will produce a metallic sodium and chlorine.

CLEVELAND—Scott & Fetzer Co., manufacturer of vacuum cleaners, 11401 Locust Ave., will construct a 2-story factory addition.

YOUNGSTOWN—Patents for new processes of cleaning and pickling steel strip and wire at high speed on continuous lines have been granted to John S. Nachtman, 1327 Fifth Ave., inventor.

PENNSYLVANIA

NORRISTOWN, PA.—United Pipe & Supply Co. Inc., Ford and Washington Sts., has

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awarded a $68,000 contract to Charles D. Burns, 103 E. Rambo St., Bridgeport, for plant additions and alterations.

PHILADELPHIA—Baltimore & Ohio Railroad, A. C. Clarke, chief engineer, Baltimore & Charles Sts., Baltimore, will rebuild a $250,000 engine house.

PHILADELPHIA—General Electric Co., 6901 Elmwood Ave., has awarded a $70,000 contract to United Engineers & Constructors Inc., 1401 Arch St., for construction of a test building.

PITTSBURGH—Pennsylvania Railroad, J. L. Gressitt, chief engineer, Broad St. Station Bldg., 1617 Pennsylvania Bldg., Philadelphia, will build a $14 million railroad terminal; plans by McKim, Mead & White, 100 Park Ave., New York.

TEXAS

BEAUMONT, TEX.—Bethlehem Steel Co. has awarded a $320,000 contract to Austin Bridge Co., 4720 Sycamore, Houston, for a mooring pier; Harder, Barbato & Ciampa, 140 Cedar St., New York, consulting engineer.

FALFURRIAS, TEX.—LaGloria Corp., Driscoll Bldg., Corpus Christi, has awarded a $475,000 contract to Hudson Engineering Corp., 2711 Danville St., Houston, for construction of a compressor plant; a $180,000 contract to Altgelt Construction Co., 429 N. Port St., Corpus Christi, for laying of a pipeline gathering system from production areas to plant; and $75,000 contract to Rosson-Richards Co., Navigation Blvd., Corpus Christi, for coating, wrapping, stringing of pipeline enroute.

HOUSTON, TEX.—Stupp Bros. Bridge & Iron Works, 3800 Weber Rd., St. Louis, contemplate building a $1 million steel fabricating plant.

HOUSTON, TEX.—Houston Oil Field Equipment Co., 300 S. Wayside Dr., will construct a $350,000 warehouse; Harvin C. Moore, 2008 W. Alabama St., engineer.

HOUSTON, TEX.—Phillips Petroleum Co., c/o K. S. Adams, president, Bartlesville, Okla., will build a $1.4 million plant.

ROBERT LEE, TEX.—Sun Oil Co., M. Esperson Bldg., Houston, will build a $2 million plant, own forces.

SAN ANTONIO, TEX.—International Harvester Co., 130 N. Michigan Ave., Chicago, has awarded a contract to W. R. Davidson Construction Co., New Moore Bldg., for remodeling of present building.

WACO, TEX.—General Tire & Rubber Co., 1708 E. Market St., Akron, will build a $125,000 plant, own forces.

VIRGINIA

RICHMOND, VA.—General Baking Co., High Point Ave. & Clay St., has awarded $1 million separate contracts for construction of a bakery and garage additions; Cowell, Robinson & Martin, 25 W. 43rd St., New York, engineer and architect.

WASHINGTON

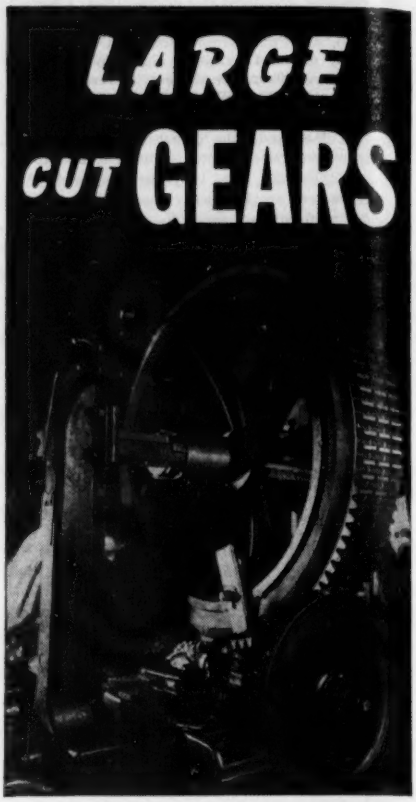
SEATTLE—Bureau of Reclamation announces awards for the last three of 18 power units for Coulee powerhouse as follows: Generators, Westinghouse Electric Co., $5,250,034; turbines, Newport News S. B. & D. D. Co., Newport News, Va., $2,497,950; transformers, General Electric Co., $1,072,011; governors, Woodward Governor Co., Rockford, Ill., $129,475.

SPOKANE, WASH. — Washington Brick & Lime Co. plans construction of $300,000 tunnel kiln and driers, increasing output of Dishman plant; general contract has been placed with Allied Engineering Co., Cleveland.

WISCONSIN

MILWAUKEE—Cutler-Hammer Co., 315 N. 12th St., will build a factory; Eschweiler & Eschweiler, 720 E. Mason St., architect.

MILWAUKEE—Western Machine Co., 180 W. Holt Ave., will let contract for a factory; Strass, Bolck & Associate, 5920 W. North Ave., engineer.



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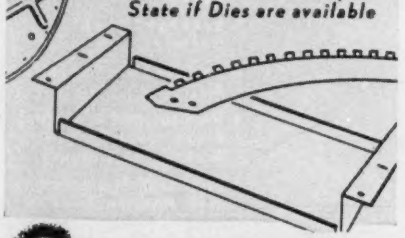

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Ferroalloy Prices

(*Continued from Page 151*)

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si; packed 19.90c; ton lots 21.00c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk 14.65-15c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices. **90-95% Ferrosilicon:** Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Odd 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe.). C.l., lump, bulk, regular 19.0c per lb of Si c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max 2% Fe grade analyzing min. 98% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 8.90c per lb of alloy, ton lots packed 10.3c, 200 to 1999 lb 10.65c, smaller lots 11.15c. Delivered. Spot up 0.5c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3⅝ lb each and containing exactly 2 lb of Cr.). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk, 10.00c per lb of briquet, c.l. packaged 10.8c, ton lot 11.6c, less ton 12.5c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.0c, per lb of briquet, c.l. packed 10.8c, ton lot 11.6c, less ton 12.5c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots, 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.). Ton lot $1.28, less ton $1.35. F.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract, $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destina-

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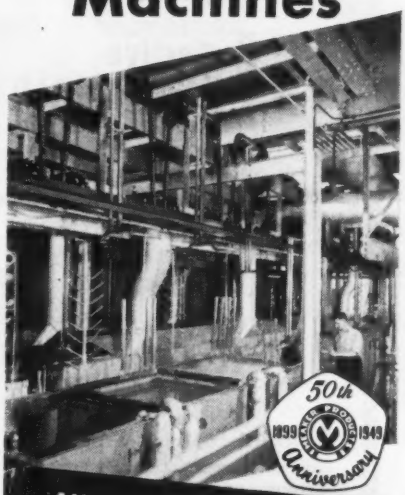

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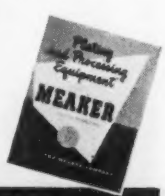

THE MEAKER COMPANY
1631 South 55th Ave., Chicago 50, Ill.
Telephone CRawford 7-7202

tion east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: Ti 17-21%, C 3-4.5%). Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

VANADIUM ALLOYS

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max). Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.), $3.10.

Vanadium Oxide: Contract, less carload lots, $1.20 per lb of contained V_2O_5, freight allowed. Spot, add 5c.

Grainal: Vanadium Grainal No. 1, 93c; No. 6, 63c; No. 79, 45c, freight allowed.

TUNGSTEN ALLOYS

Ferrotungsten: (W 70-80%). Contract, 10,000 lb W. or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W., $3.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more. 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered, Spot, add 5c.

Borosil: (3 to 4% B, 40 to 45% Si), $6.25 per lb contained B, f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). **Net** ton lot carload, 8c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60% Mn 5% max., Si 8% max, C 0.5% max.). Contract, ton lot, 2" x D, $2.90 per lb of contained Cb, less ton $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-8%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr. 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0.75%). Carload packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 16.5c per lb of alloy, ton lots 17.25c, less ton 18.5. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 16.50-17.00c per lb of alloy; ton lots 17.90-18.00c; less ton lots 19.40-19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Packed, lump, carload 11c, ton lots 11.25c, smaller lots 11.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Ferrophosphorus (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base): Gross tons per carload, f.o.b. sellers' works, Mt. Pleasant, or Siglo, Tenn.; $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., any quantity $1.10.

Technical Molybdic-Oxide: Per lb, contained Mo, f.o.b. Langeloth, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.

Use Oakite Special Protective Oil to STOP THAT RUST!

OAKITE Special Protective Oil displaces moisture from ferrous surfaces and leaves a thin, transparent film that effectively resists corrosion between production operations and during temporary indoor storage. It offers important advantages:

1. **Easy to apply** by dipping, swabbing, brushing or spraying. No heat required.

2. **Saves money** by draining rapidly, holding drag-out to minimum. Large areas of metal covered with small amount of oil. Frequently eliminates need for expensive drying.

3. **Thin film** does not interfere with gauging of machined parts or with soldering or welding of light - gauge metals.

4. **Neutralizes and removes** finger marks, perspiration residues and other corrosion stains. Does not discolor machined surfaces or paper used for wrapping metal products.

5. **Easy to remove** by solvent or alkaline cleaning.

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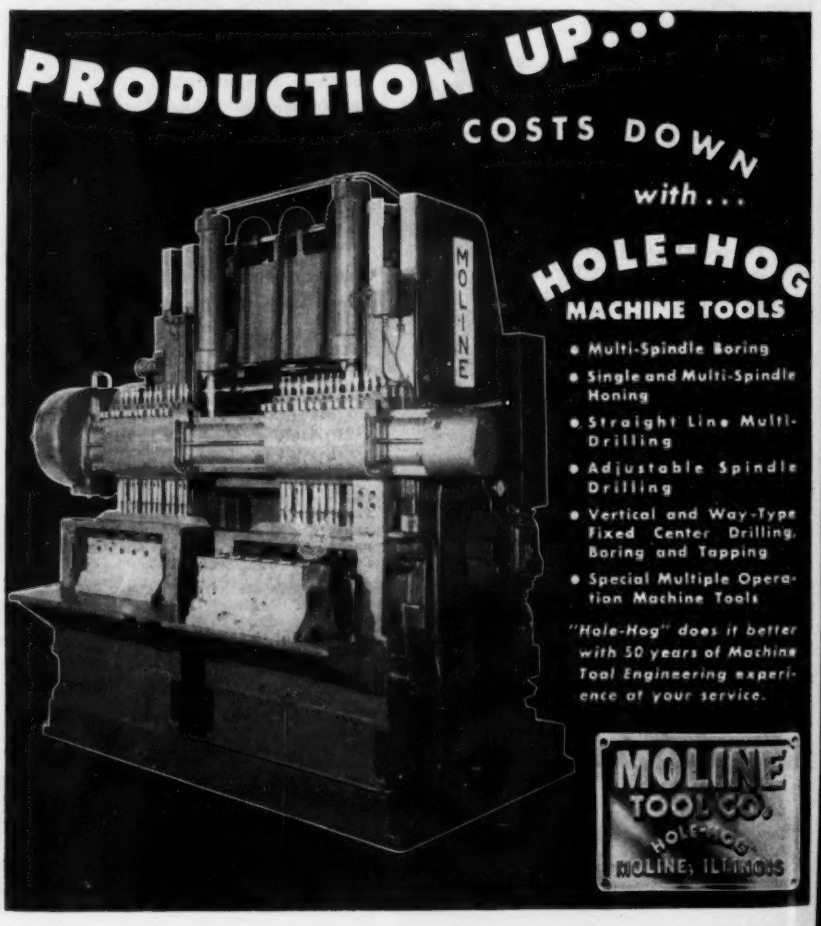
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